Transition Report

American River/Folsom South Conjunctive Use Optimization Study

(aka: The Stanislaus River Basin and Calaveras River Water Use Program)

May 1996

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

C-057698

ACKNOWLEDGMENTS

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The above listing of contributors does not include employees with the State of California. The acknowledgment of State employees who contributed to the American River/Folsom South Conjunctive Use Optimization Study is recognized through their efforts in the independent study report completed by the California Department of Water Resources entitled "Memorandum Report on the Stanislaus River Basin and Calaveras River Water Use Program, December 1995."

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CHAPTER 1

INTRODUCTION

Study Name

The American River/Folsom South Conjunctive Use Optimization Study is known by several names. The U.S. Fish and Wildlife Service (FWS) has referred to it by three names: the Stanislaus/Calaveras Conjunctive Use Study; the American River Conjunctive Use Study; and, the Stanislaus River Basin and Calaveras River Water Use Program. The California Department of Water Resources (CDWR) initially referred to the study as the Stanislaus and Calaveras River Basins Water Management Study, but changed the name to the Stanislaus River Basin and Calaveras River Water Use Program. The U.S. Bureau of Reclamation (Reclamation) refers to the study as the American River/Folsom South Conjunctive Use Optimization Study. Public Law 102-575, Section 3406(c)(2) refers to the study as the Stanislaus River Basin and Calaveras River Water Use Program. For purposes of this report, Reclamation will refer to the study as the American River/Folsom South Conjunctive Use Optimization Study (Optimization Study).

Report Purpose

The Optimization Study was a joint study between Reclamation and CDWR to develop a long-term water use plan for the area between the Stanislaus and Calaveras Rivers. This report documents the study activities of Reclamation in the Optimization Study.

CDWR informed Reclamation in November 1994 that it needed to reevaluate the agency's continued participation in the Optimization Study as the non-Federal sponsor . CDWR decided to independently evaluate the availability of water from the Stanislaus River. CDWR and Reclamation had different objectives concerning the Optimization Study. CDWR was looking for additional water to supplement the yield of the State Water Project. Reclamation wanted to optimize water use in the study area while honoring its contract and agreement commitments. These commitments include the 1987 Agreement between the United States and the California Department of Fish and Game (CDFG) for fishery flows on the Stanislaus River; the 1988 Agreement among the United States, Oakdale Irrigation District and the South San Joaquin Irrigation District (Agreement No: 8-07-20-W0714); and California State Water Resources Control Board Decision-1422 requirements.

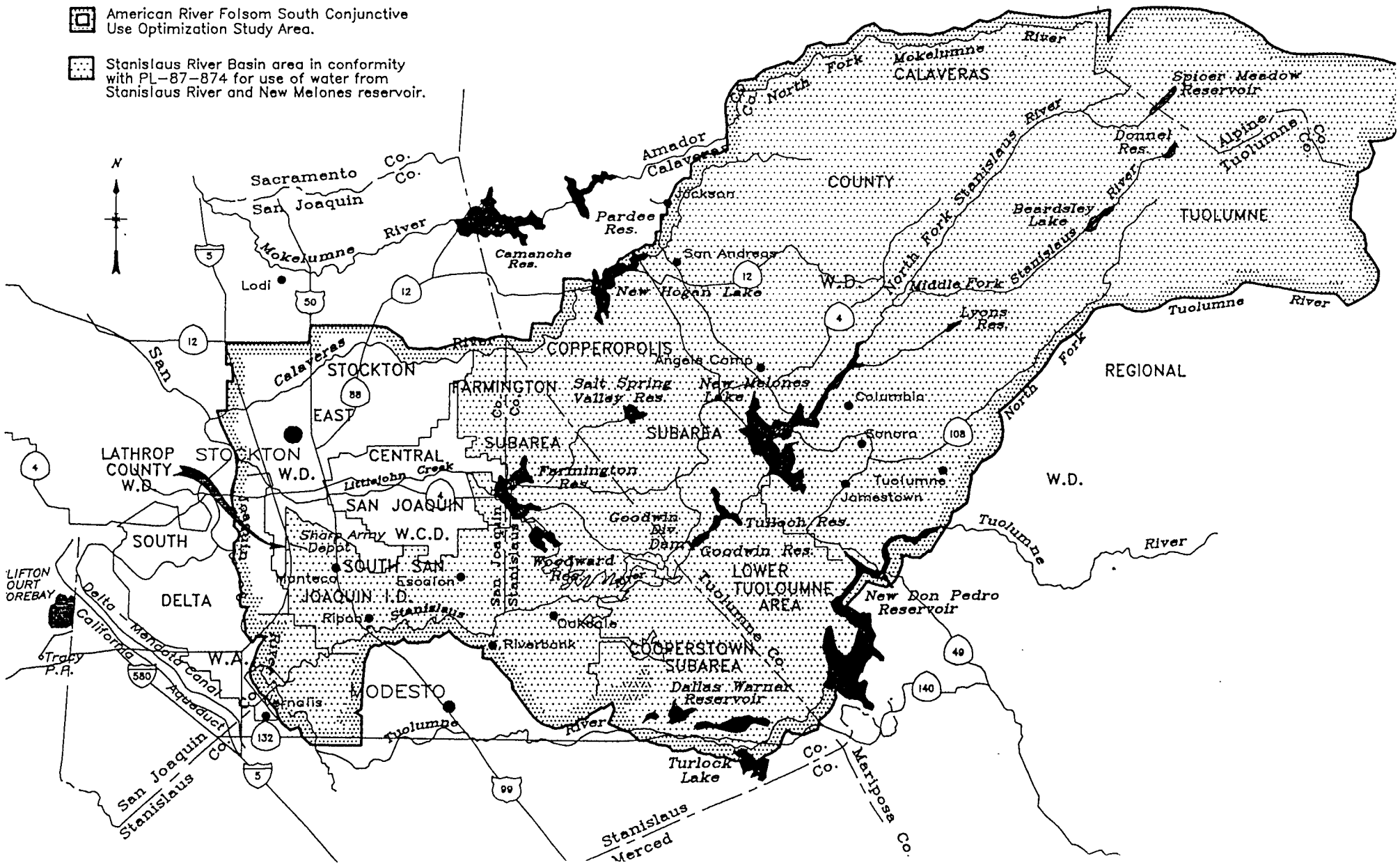
A letter dated March 3, 1995 formally notified Reclamation that CDWR was terminating its participation in the Optimization Study. CDWR felt that the Optimization Study would not likely result in any increased yield to the State Water Project. Any interim water supplies that may have been available prior to Public Law 102-575 for use outside the study area will probably be needed to meet water quality and fish and wildlife requirements as required by both Public Law 102-575, Title 34 (the Central Valley Project Improvement Act) and the December 1994 Bay-Delta Accord.

Funding for the Optimization Study by Reclamation is made possible with General Investigation (GI) Appropriations, which requires a 50 percent non-Federal cost sharing partner. With CDWR's termination of their participation in the Optimization Study, Reclamation is without a cost sharing partner. After evaluating the status of the study, Reclamation decided not to continue with the Optimization Study. Owing to the ongoing Reclamation activity entitled New Melones Water Management Plan, Short-Term, and the lack of funding in fiscal year 1996 for the Optimization Study, it is advantageous to write a report documenting study activities to date. The purpose of the New Melones Water Management Plan, Short-Term, is to develop an interim plan of operation and a suitable method of allocation to manage available water supplies in the Stanislaus River Basin until such time as either the State Water Resources Control Board has completed their water rights process for the Bay Delta Water Quality Control Plan or a long-term agreement for operation is negotiated among the stakeholders. The New Melones Water Management Plan, Short-Term, is scheduled for completion in September 1996.

The New Melones Water Management Plan, Long-Term, is the second phase and is intended to develop a long-term water operations strategy for New Melones Reservoir. The objective of this study is to negotiate a consensus among stakeholders concerning long-term reservoir operation. If it is determined that upon completion of both the New Melones Water Management Plan, Short-Term and Long-Term, that there are still unmet demands, a new planning study will be developed to address these needs.

Included in this report is information obtained from the American River Water Resources Investigation (ARWRI) to meet requirements under Public Law 102-575, Title 34, Section 3406(c)(2). A portion of the study area for the ARWRI overlaps that of the Optimization Study. This information is presented in Appendix A. Appendix A contains a description of the water needs of the area common to both the ARWRI and the Optimization Study; a description of how the ARWRI alternative plans will satisfy those needs; and, a description of the relative opportunities for meeting the Vernalis standard by reducing reliance on Stanislaus River water.

Figure 1
American River Folsom South
Conjunctive Use Optimization Study



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Study Location

The study area is located in central California along the western slope of the Sierra Nevada mountains. It includes portions of Alpine, Calaveras, Tuolumne, Stanislaus, and San Joaquin Counties. Major rivers and tributaries in the area include the Stanislaus River, Calaveras River, San Joaquin River, Mormon Slough, Littlejohns Creek, Shirley Creek, and Duck Creek. The Study area is bounded by the Calaveras River on the north, the lower San Joaquin River on the west, the Stanislaus River and Tuolumne River on the south, and the Sierra Nevada mountains on the east. A map of the Study area is shown in Figure 1. The study area includes the Stanislaus River Basin, the Stockton East Water District, the Central San Joaquin Water Conservation District, and the Sharpe Army Depot. The definition of the Stanislaus River Basin is in conformity with Public Law 87-874 and the Record of Decision, Stanislaus River Basin Alternatives and Water Allocation, New Melones Unit, Central Valley Project, California, June 29, 1981.

Authorization of New Melones Reservoir

The New Melones Reservoir was originally authorized by the Flood Control Act of December 22, 1944. The U.S. Army Corps of Engineers would construct the project to alleviate flood control problems along the Stanislaus River and lower San Joaquin River. The Act of October 23, 1962 (Public Law 87-874) expanded and reauthorized the New Melones Reservoir to provide for additional benefits. This reauthorization stated, in accordance with the recommendations of the Chief of Engineers, "that upon completion of construction of the dam and powerplant by the Corps of Engineers the project shall become an integral part of the Central Valley Project and be operated and maintained by the Secretary of the Interior pursuant to the Federal reclamation laws." In addition, Public Law 87-874 stated "that before initiating any diversions of water from the Stanislaus River Basin in connection with the operation of the Central Valley Project, the Secretary of the Interior shall determine the quantity of water required to satisfy all existing and anticipated future needs within that basin and the diversions shall at all times be subordinate to the quantities so determined."

CHAPTER 2

BACKGROUND

Study Background

In September 1980, Reclamation issued a report entitled "Stanislaus River Basin and Water Allocation." The report investigated several water allocation alternatives and different definitions of the Stanislaus River Basin. This report formed the basis of the Record of Decision made by Secretary Hodel on June 29, 1981 for the determination of the Stanislaus River Basin (Basin), and it recommended allocations for New Melones water. In this allocation, the water needs of the various entities within the Basin are estimated for year 2020 conditions. This Basin allocation will need to be supplied before considering the diversion of water outside of the Basin. The projected long-term water allocation for the Basin as stated in the above 1980 water allocation report, totaled 131,000 acre-feet for year 2020 conditions. The remaining yield of 49,000 acre-feet in year 2020 is to be allocated to the Central San Joaquin Water Conservation District (CSJWCD) which is located outside of the Basin . This will alleviate part of the groundwater overdraft in this district. In addition, the district is situated very close to the Stanislaus River and will require a minimum amount of conveyance facilities.

Full buildup of the estimated Basin requirements will take time. Until this occurs and firm water supply contracts are signed, interim water supplies were assumed to be available for use in areas outside the Basin. In December 1983, the Stockton East Water District (SEWD) and CSJWCD contracted with Reclamation for annual water deliveries of interim supplies of 75,000 acre-feet and 31,000 acre-feet, respectively. With the firm supply of 49,000 acre-feet, the total amount of the contract for water with the CSJWCD is 80,000 acre-feet. These combined proposed deliveries equal 155,000 acre-feet.

In 1986, SEWD and CSJWCD proposed to CDWR and Reclamation a conjunctive use plan for the 155,000 acre-feet of contract water. SEWD and CSJWCD will divert their contract water in wet years; the districts will not divert this water in dry and critically dry years but rather will allow it to be released down the Stanislaus River and lower San Joaquin River for use by others. In dry years, the two agencies will revert to pumping groundwater.

A Memorandum Of Understanding (MOU) was signed on March 15, 1989 in which Reclamation, CDWR, and 15 other participating agencies agreed that a comprehensive study and environmental documentation are needed to address the many interrelated issues involved in using the resources of the Stanislaus and Calaveras Rivers. These 15 participating agencies

are: The California Department of Fish and Game (CDFG), Calaveras County, San Joaquin County, Stanislaus County, Tuolumne County, Calaveras County Water District, CSJWCD, Lathrop County Water District, South Delta Water Agency, SEWD, Tuolumne Regional Water district, City of Escalon, City of Manteca, City of Ripon, and the City of Stockton.

Reclamation and CDWR jointly published a Scoping Report in January 1991 that identified the issues to be used in developing the long-term plan for optimizing the uses of groundwater and surface water in the area between the Stanislaus and Calaveras Rivers. These issues are to be addressed in the plan and the accompanying Environmental Impact Statement/ Environmental Impact Report (EIS/EIR). The scoping process is used to provide an early and open forum for determining the significant issues which need to be evaluated.

The objective of the Optimization Study is to meet the following goals:

- Preserve and protect water resources for long term use in areas of origin.
- Meet current and projected local agricultural, and municipal and industrial water needs in the study area.
- Provide increased instream flows for fishery and wildlife in the Stanislaus and San Joaquin Rivers.
- Improve water quality in the Stanislaus River, lower San Joaquin River, and southern Delta channels.
- Increase the yield of the Central Valley Project and State Water Project and assist in meeting Delta outflow requirements.

Reclamation and CDWR signed a Memorandum of Agreement on September 18, 1991, stipulating the cost sharing responsibilities for the study. Federal policy requires that at least 50 percent of the cost of the study be provided by a non-Federal sponsor. The non-Federal share can be in the form of up-front cash or specific in-kind services.

On March 26, 1993, Reclamation and CDWR signed a Memorandum of Agreement in which both agencies agreed to publish a joint EIS/EIR. The agreement described the responsibilities and functions of each agency in the preparation of all environmental documentation necessary to evaluate changes in social, economic, and environmental conditions occurring as a result of implementing alternative future actions. However, the writing of the EIS/EIR was the responsibility of CDWR.

Public Law 102-575 was signed on October 30, 1992. Public Law 102-575, Title 34, Section 3406(c)(2) stated that in the course of preparing the Stanislaus River Basin and Calaveras River Water Use Program Environmental Impact Statement (in consultation with the State of

California, affected counties, and other interests), an evaluation and determination of existing and future anticipated needs in the Basin must be conducted. This investigation would include alternative storage, release, and delivery regimes including conjunctive use operations, conservation strategies, exchange arrangements, and the use of base and channel maintenance flows to best satisfy both Basin and out of basin needs that are consistent with the limitations and priorities of the Act of October 23, 1962 (76 Stat.173). These limitations and priorities specify that before initiating any diversions of water from the Basin in connection with the operation of the Central Valley Project, the Secretary of Interior shall determine the quantity of water required to satisfy all existing and anticipated future needs within the Basin and that diversions shall at all times be subordinate to the quantity so determined.

The enactment of Public Law 102-575 did impact the Optimization Study. Public Law 102-575 directed Reclamation to make annual releases of 800,000 acre-feet of dedicated yield from Central Valley Project reservoirs for the purpose of fish, wildlife, and habitat restoration purposes. In 1993, the first year of implementing the 800,000 acre-feet requirement, New Melones Reservoir was required to release 200,000 acre-feet. In December 1994 new Bay-Delta water quality requirements were announced.

In November 1994, CDWR decided to reevaluate its participation in the Optimization Study as the non-Federal sponsor. CDWR decided to independently evaluate the availability of water from the Stanislaus River. In December 1995, CDWR published a Memorandum Report on the Stanislaus River Basin and Calaveras River Water Use Program. This report documented their independent evaluation. Reclamation and CDWR had different goals concerning the Optimization Study. CDWR was seeking additional water for the State Water Project. Reclamation was seeking to optimize water use in the study area while honoring its contract and agreement commitments. These commitments include the 1987 Agreement between the United States and the California Department of Fish and Game (CDFG) for fishery flows on the Stanislaus River; the 1988 Agreement among the United States, Oakdale Irrigation District and the South San Joaquin Irrigation District (Agreement No: 8-07-20-W0714); and California State Water Resources Control Board Decision-1422 requirements. CDWR terminated its participation in the Optimization Study on March 3, 1995 since it felt that no water would be made available for use outside the Basin after meeting existing commitments and new requirements under Public Law 102-575 and the December 1994 Bay-Delta Accord.

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CHAPTER 3

PLAN FORMULATION

Interdisciplinary Team Formulation

The National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) each require public agencies to consider the environmental consequences of proposed projects. Reclamation and CDWR agreed to follow NEPA and CEQA requirements in the preparation of a planning report and EIS/EIR for the Optimization Study using an interdisciplinary approach. The interdisciplinary approach ensures the integrated use of the natural and social sciences and the environmental design arts in the decision making process. An Interdisciplinary (ID) Team was formed and included representatives from Reclamation, the U.S. Fish and Wildlife Service (FWS), the U.S. Environmental Protection Agency (EPA), CDFG, and CDWR. The ID Team met on a monthly basis for over 3 years and assisted the joint lead agencies in directing and managing the study.

Public Meetings/Participant Meetings

Public involvement was encouraged through a series of public meetings. The public included those individuals and/or entities that were the signatories to the MOU, state and local agencies, irrigation districts, environmental groups, and the general public. The public meetings clarified the expectations and concerns of the interested parties and provided an important method to incorporate their expectations and concerns into the study. It was anticipated that public meetings would be held between 3 and 6 months apart. Four public meetings were held.

Planning Objectives

The planning objectives were developed through the concerted actions of Reclamation, CDWR, the ID team, and the public. The final planning objectives are:

- To determine Stanislaus River Basin (Basin) needs as referenced in Public Law 102-575. Basin needs include water supply for agricultural, municipal and industrial purposes, and maintenance and enhancement of water quality and fish and wildlife resources.

- To best satisfy Basin and out-of-basin needs including but not limited to the State Water Project and Central Valley Project, investigate alternative storage,

release and delivery regimes including conjunctive use operations, water transfer agreements, conservation strategies, exchange agreements, and the use of base and channel maintenance flows.

NOTE: The Basin is as defined in U.S. Department of the Interior Record of Decision 1981. Priority of Basin and out-of-basin needs is as referenced in Public Law 87-874 (the act of October 23, 1962; 76 Stat. 1173).

Exclusionary Screening Criteria

Reclamation, CDWR and the ID Team determined that exclusionary screening criteria were needed to be able to help narrow the range of proposed alternatives. It was intended that the exclusionary screening criteria would be used to eliminate proposed alternatives which were outside the scope of the study. The exclusionary screening criteria gave the participants a clear indication of the limitations of the study. They also provided a defined set of expectations which was available to all interested parties wishing to develop a range of reasonable alternatives. The exclusionary screening criteria were developed by the ID Team and were presented to the public for review and comment at the public participation meetings. The final exclusionary criteria are:

- The alternatives must be technically and reasonably feasible and legal.
- The alternatives must focus on meeting the needs in the Stanislaus River Basin prior to considering other needs.

Existing Conditions

Existing conditions was defined as the conditions existing immediately prior to the signing of Public Law 102-575. For study purposes, this was determined to be the operating rules and agreements which were in place as of October 1, 1992. A summary of these conditions is as follows:

- 1988 Agreement among the United States, OID, and SSJID (Agreement No: 8-07-20-W0714)
- Decision -1422 requirements at Vernalis (irrigation season only)
- 1987 instream flow agreement for fishery flows on the Stanislaus River between the United States and CDFG
- No deliveries of water to SEWD and CSJWD under their 1983 contracts
- 1990 level of development.

No-Action Alternative

The No-Action Alternative was determined to be the same as the existing conditions with two exceptions:

- Year 2020 level of development
- Firm supply of 49,000 acre-feet to CSJWCD

Other Proposed Alternatives

The action alternatives for this study had not been finalized at the time that CDWR terminated its participation. Public Law 102-575 was signed into law shortly before the ID Team began attempting to define alternatives. Owing to the uncertainty in how certain provisions of the CVPIA were to be implemented (most notably the 800,000 acre-feet of dedicated water) and the potential serious impacts to the Stanislaus River Basin, it was decided that the best approach would be to model a wide range of operational possibilities. Once the broad range of simulations was completed, it was anticipated that the ID Team would then review the results and begin to combine concepts that appear to be feasible into more cohesive alternatives for consideration. It was envisioned that a range of instream fish flows would be considered, as well as a range of flows to meet the dedicated water requirement. Variations on supply to SEWD/CSJWCD would also be investigated to determine the feasibility of an off-stream storage facility.

Modeling/Operation Studies

Reclamation and CDWR agreed to complete designated responsibilities and functions in the March 26, 1993 Memorandum of Agreement concerning the preparation of all environmental documentation necessary for the EIS/EIR. Reclamation agreed to conduct the surface water studies and CDWR agreed to complete the groundwater studies of the alternatives. The surface water model Reclamation choose to use for the operation studies of the alternatives was the San Joaquin Area Simulation Model (SANJASM). Although the modeling assumptions were determined and agreed upon for both existing conditions and the 2020 No-Action Alternative, no computer modeling simulations were made. CDWR and Reclamation were in the process of providing peer review of the SANJASM when CDWR decided to terminate its participation in the Optimization Study. CDWR did not complete their review of the SANJASM.

Reclamation developed the Calaveras River Temperature Model to evaluate existing and proposed project operations on temperatures in the Calaveras River from New Hogan Reservoir to the mouth of the Calaveras River. Temperature model output will be useful in evaluating project impacts on fisheries and fishery habitat. The Model is comprised of a reservoir component and a river component. A reservoir model similar to the one documented in the report "Stanislaus River Basin Temperature Model - USBR-June 1993" was developed for New Hogan Reservoir.

The model was calibrated and verified for the period 1990-1993. Temperature profiles measured in the spring and later summer for all four years were used in the calibration process.

A steady steam temperature model was developed for the Calaveras River. USGS quads were used to identify 56 reaches covering a 45 mile section of the river from New Hogan Reservoir to the mouth of the Calaveras River. Average stream widths and shade cover for each river reach were estimated from aerial photos. Relationships between flow and stream width were developed from FWS instream flow field studies. USGS/CDWR water temperature records will be used for calibration/verification of the Calaveras River model.

Future work on the Calaveras Temperature Model would include additional calibration and verification, documentation, and application to studies. Monthly SANJASM output can be used as input to the temperature model.

Other Studies

In August 1992, Stanislaus County published a "Report on Future Water Needs for that Portion of Stanislaus County in the Stanislaus River Basin." The report was prepared by Stanislaus County for use in the Optimization Study. The purpose of the report was to make sure that local water needs were given adequate attention in the Optimization Study. The report provided estimates of agricultural, urban, fishery, and recreational (rafting) water needs in that portion of Stanislaus County that is in the Stanislaus River Basin. A copy of this report can be obtained from Stanislaus County.

Agricultural and urban water demand estimates at the 1990 level of development and the 2020 level of development were developed by CDWR. These water demand estimates are included in the December 1995 "Memorandum Report on the Stanislaus River Basin and Calaveras River Water Use Program." A copy of this report can be obtained from CDWR.

CHAPTER 4

ENVIRONMENTAL STUDIES

Types of Studies

Key environmental studies conducted in association with the Optimization Study were:

1) Baseline Habitat Evaluation Procedures (HEP) Study conducted by the project HEP team. The complete baseline HEP Team study is in Appendix B.

2) Planning Aid Memorandum from FWS to Reclamation. The complete memorandum is in Appendix C.

3) "Stanislaus River Basin and Calaveras River Water Use Program Threatened and Endangered Species Report" conduced by staff of the CDFG. This Report was published under separate cover in March 1995.

4) Geographic Information System (GIS) maps of cover types along the lower Stanislaus River completed by CDWR.

5) "Stanislaus River Basin and Calaveras River Water Use Program Draft Coordination Act Report," published by FWS in September 1995.

Habitat Evaluation Procedures Study

The purpose of the HEP wildlife habitat suitability study is to determine the existing terrestrial conditions along the Stanislaus River for selected wildlife species. The analysis utilizes the Habitat Evaluation Procedures developed by FWS in the early 1970's to assess the quantity and quality of fish and wildlife habitats and to quantify changes resulting from land and water development projects or project re-operations.

HEP documents baseline conditions of habitats as a gauge for estimating effects of proposed habitat modifications, and can provide information for two types of habitat comparisons: 1) the relative values of different areas at the same time; and, 2) the relative values of the same area at future points in time. HEP can be involved in all project phases including project planning, impact assessment, mitigation and compensation of impacts, and habitat management.

HEP is a habitat-based evaluation methodology used to quantify 1) baseline wildlife habitat values; 2) impacts from the proposed actions; and, 3) gains in habitat values on mitigation areas with management. HEP is based on the assumption that habitat quality and quantity can be numerically described in terms of habitat units.

Advantages of HEP are that it is 1) standardized for consistency and repeatability; 2) interdisciplinary for addressing a broad range of resource issues and concerns; 3) comprehensive in analysis of habitat impacts; and 4) flexible in level of detail used in applications. HEP quantifies impacts in terms of area and quality and requires that all phases of a study be well documented for methods, processes, and assumptions.

Habitat quantity is easily measurable. Although many techniques exist for quantifying habitat quantity, the one most often used relies on aerial photography. Computer generation of habitat maps is then achieved. Habitat types, such as "riverine" or "riparian", are delineated for the study area.

Aerial photographs, flown June 10, 1993, at a river flow of 200 cubic feet per second and at a scale of 1 inch = 6,000 feet were taken by Reclamation. Habitat types were delineated on clear mylar envelopes in which an aerial photograph was inserted. Later, the information was digitally converted into maps by CDWR staff using AUTOCAD geographic information system.

Habitat quality is more difficult to determine and differs from one species to another. The HEP team determines which species or group of species using existing habitats will most effectively characterize impacts from a proposed project alternative. For each evaluation species, models are located, modified, and/or created to assess habitat suitability in terms of cover, water, food, and reproduction requirements. After a review of species currently associated with the lower Stanislaus River, fifteen evaluation species were selected for this study including the muskrat, great blue heron, western meadowlark, little brown bat, acorn woodpecker, western fence lizard, and rufous-sided towhee. During pre-field studies, the HEP team members drafted procedures for data collection that were used during the 1994 spring field season.

Habitat quality for a given evaluation species is assigned through use of a Habitat Suitability Index (HSI) model. HSI values quantify the value of the habitat types to each evaluation species. The HSI value multiplied by acres of a habitat type equals Habitat Units (HU), and HU's are the numerical basis of the HEP analysis. The following table provides the final values for the study and can be used to analyze future alternatives.

Stanislaus River Baseline Habitat Evaluation Procedures Analysis by Reach, Cover Type and Evaluation Species from Goodwin Dam to the Confluence of the San Joaquin River--59 River Miles

Cover type	Evaluation Species	Habitat Suitibility Index	Acres	Habitat Units
	Reach 1--Canyon Reach			
Oak Woodland	1 Acorn Woodpecker	0.86	143.97	123.81
	2 Rufous-Sided Towhee	0.45	143.97	64.79
	3 Western Bluebird	0.48	143.97	69.11
Grassland	6 American Kestrel	0.71	272.46	193.45
	7 Western Meadowlark	0.87	272.46	237.04
Riparian	8 California Quail	0.54	83.71	45.20
	9 Riparian Songbird Guild	0.88	83.71	73.66
	10 Western Fence Lizard	0.35	83.71	29.30
Riverine	11 Muskrat	0.22	29.81	6.56
	12 River Otter	0.32	29.81	9.54
	13 Shaded Riverine Aquatic	0.26	29.81	7.75
Rockland	14 Dipper	0.89	133.00	118.37
	15 Little Brown Bat	1.00	133.00	133.00
	Average	0.60	121.80	85.51
	Reach 2--Foothill Reach			
Oak Woodland	1 Acorn Woodpecker	0.90	55.85	50.27
	2 Rufous-Sided Towhee	0.67	55.85	37.42
	3 Western Bluebird	0.67	55.85	37.42
Fresh Emergent Wetland	4 Great Blue Heron	0.00	6.35	0.00
	5 Marshland Songbird Guild	0.55	6.35	3.49
Grassland	6 American Kestrel	0.26	282.46	73.44
	7 Western Meadowlark	0.92	282.46	259.86
Riparian	8 California Quail	0.17	326.17	55.45
	9 Riparian Songbird Guild	0.40	326.17	130.47
	10 Western Fence Lizard	0.49	326.17	159.82
Riverine	11 Muskrat	0.20	77.36	15.47
	12 River Otter	0.49	77.36	37.91
	13 Shaded Riverine Aquatic	0.47	77.36	36.36
	Average	0.48	150.44	69.03

	Reach 3--Valley Reach				
Fresh Emergent Wetland	4	Great Blue Heron	0.13	1.08	0.14
	5	Marshland Songbird Guild	0.48	1.08	0.52
Grassland	6	American Kestrel	0.37	473.38	175.15
	7	Western Meadowlark	0.91	473.38	430.78
Riparian	8	California Quail	0.31	2255.56	699.22
	9	Riparian Songbird Guild	0.81	2255.56	1827.00
	10	Western Fence Lizard	0.32	2255.56	721.78
Riverine	11	Muskrat	0.22	538.43	118.45
	12	River Otter	0.33	538.43	177.68
	13	Shaded Riverine Aquatic	0.43	538.43	231.52
		Average	0.43	933.09	438.23

Planning Aid Memorandum

The Planning Aid Memorandum (Memorandum) was provided to assist the planning process as outlined under Section 2 of the Fish and Wildlife Coordination Act (in 16 U.S.C. 661 et seq.). This report identifies fish and wildlife resources within the project area, and provides recommendations to protect existing fish and wildlife resources and to minimize resource losses caused by project operation. Reclamation is legislatively directed by Section 203 of the Flood Control Act of 1962 (Act of 1962) to meet all "in-basin" needs prior to using Stanislaus River water for "out-of-basin" needs. The recommendations are designed to address all Stanislaus River in-basin needs, as required by the authorizing legislation, prior to allocating water outside the Stanislaus River Basin. Recommendations for enhancement are also included. This report is intended to provide the foundation upon which alternatives, conclusions and recommendations can be developed.

The following are the recommendations provided in the memorandum. They are supported principally by FWS and CDFG ongoing studies which provide recommendations to meet the immediate "interim" Stanislaus River instream flows. First, the FWS's "The Relationship Between Instream Flow and Physical Habitat Availability for Chinook Salmon in the Stanislaus River, California" (Instream Flow Report), May 1993, which evaluated Stanislaus River instream flows related to providing physical habitat availability for chinook salmon. Second, CDFG's August, 1992 "Salmon Habitat - Stanislaus River" evaluation considered anadromous fisheries, water quality, and resident rainbow trout needs.

Fish and Wildlife Service Recommendations

1. Meet all in-basin needs including those of fish and wildlife, prior to committing water for out-of-basin needs.

2. Implement the Stanislaus River instream flows from FWS's May 1993 Instream Flow Report where the annual minimum base fishery flow regime for all water year "types" totals 155,705 acre-feet. Reclamation and CDFG should enter into a new Memorandum of Understanding (MOU), replacing the current MOU and embracing the recommended flow regime. An in-basin need requirement of the Act of 1962 should be adopted as the minimum "interim" flows in the Stanislaus River until supplemental studies are completed. Specifically, the recommended 155,705 acre-feet minimum should replace the "98,300 acre-feet annually with provisions for release of 69,000 acre-feet in critically dry years" in the 1987 interim agreement with CDFG.

3. Complete the supplemental studies identified in the 1987 interim agreement with CDFG. The results of these fishery studies should be integrated with the Instream Flow Report, the Stanislaus River Temperature Model and other available and appropriate data (such as information provided by the Anadromous Fish Restoration Program pursuant to CVPIA) to develop a comprehensive instream flow schedule for the Stanislaus River in cooperation with FWS and CDFG.

4. Expand on the salmon spawning gravel restoration projects conducted by CDFG.

5. Prepare and implement a plan for the enhancement and restoration of riparian habitat due to its reduction and deterioration. The Habitat Evaluation Procedures Study can be used as baseline. Options to consider in the plan include setback levees and habitat expansion of the endangered riparian brush rabbit, *Sylvilagus bachmani riparius.*

6. Reevaluate unmet mitigation for the original project. Expand the 2,500 acre Peoria Mountain Wildlife Management Area to resolve unmet terrestrial wildlife habitat mitigation requirements. Compensate for construction of the "Baseline Conservation Camp" in the Management Area. Evaluate the extent, adequacy and effectiveness of the riparian habitat fee/easement acquisition effort.

7. Consider investigating the condition of the ecosystem of the Calaveras River including the status of a previously described chinook salmon population. Populations have dropped dramatically in recent years, owing to insufficient stream flows during critical times of the year or during periods of drought, impairment of

migration owing to dams, and unscreened agriculture and municipal diversions.

Threatened and Endangered Species Report

"Late in 1993, CDWR contracted with CDFG to conduct surveys for determining the presence and distribution of listed and candidate species including amphibians, reptiles, birds, and mammals along the Stanislaus River. The study area is the same used by the HEP team. Threatened and endangered species surveys were needed to determine the baseline environmental conditions of the Stanislaus River. This baseline information will be used to evaluate environmental affects by a proposed project or alternative and would be included in any future EIS/EIR. The contract for the threatened and endangered species work was signed 4 October 1994 by CDWR and CDFG, and formal surveys began in early November 1994. This report describes the study area; the methodology used for CDFG surveys; and those listed and candidate species, their range and the potential for occurrence along the Stanislaus River, and possible impacts." (CDFG, 1995)

In early December 1994, CDFG biologists were instructed to suspend work related to this activity while CDWR considered withdrawing from the program. "Due to the early suspension of wildlife surveys, the information contained within this report is the result of a literature search and a limited survey effort." (CDFG, 1995)

Listed, proposed and candidate species that may be found within the study area include the endangered giant garter snake (*Thamnophis gigas*) and the California red-legged frog (*Rana aurora draytoni*), which is proposed as endangered. Threatened species include valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Delta smelt, Aleutian Canad (*Hypomesus transpacificus*), which could be affected by changes in flows to a goose (*Branta canadensis leucopareia*), and bald eagle (*Haliaetus leucocephalus*). Candidate species include southwestern pond turtle *(Clemmys marmorata pallida*), California tiger salamander (*Ambystoma tigrinum californiense*), Swainson's hawk (*Buteo swainsoni*), loggerhead shrike (*Lanius ludovicianus*), western mastiff bat (*Eumops perotis californicus*), and San Joaquin pocket mouse (*Perognathus inornatus inornatus*). The Federal candidate species riparian brush rabbit (*Sylvilagus bachmani riparius*) and riparian woodrat (*Neotoma cinerea riparia*) are found only at or near Caswell Memorial State Park. The state of California has recently listed the riparian brush rabbit as state endangered. The National Marine Fisheries Service, who has jurisdiction to manage anadromous fisheries, is currently conducting a status review of all anadromous salmon and trout on the pacific coast (excluding Alaska). Fall-run chinook salmon of the San Joaquin Basin (Merced, Stanislaus and Tuolumne rivers), is a component.

CHAPTER 5

ONGOING AND POTENTIAL STUDIES

Study Examinations

There are concerns that the water supply of New Melones Reservoir is over committed. The 1987 through 1992 drought period was more severe than the historical drought period ending in 1934. Demands on New Melones Reservoir have increased from those assumed in the earlier analysis completed by Reclamation. The implementation of CVPIA has placed an additional demand on the reservoir. In addition, requests for delivery of water to SEWD and CSJWCD have been made pursuant to their 1983 contracts. A reservoir storage of 300,000 acre-feet in October is desired for fall releases so that Stanislaus River temperatures can be maintained low enough for spawning fall run chinook salmon. In April 1994, the Water Branch, Water and Power Operations Office completed a preliminary analysis that reevaluated the historical yield of New Melones Reservoir. The preliminary reevaluation of historic yield concluded that it is questionable that New Melones Reservoir can meet all of the present day demands.

The New Melones Water Management Study, Short-Term, is currently underway by Reclamation. Its goals are to develop a clear plan of operation and a suitable method of allocation to manage available water supplies in the Stanislaus River Basin. The operation plan and method of allocation to manage the available water supplies developed through the New Melones Water Management Study, Short-Term, will be in effect during the interim period until the State Water Resources Control Board completes the water rights phase of the Bay-Delta hearings or until a long-term operation plan for New Melones Reservoir is negotiated through consensus with the stakeholders. The results of the New Melones Water Management Study, Short-Term, will assist the Central Valley Operations Office in operating New Melones Reservoir for this interim period. No environmental documentation is required since the operation plan will be within the existing scope of operations. Currently there is no definite plan of operation or established method of allocation on the Stanislaus River. Predicable operating criteria will be developed that will enable users to plan ahead to make the best use of their water supplies during different hydrologic conditions. This study is scheduled for completion in September 1996.

The New Melones Water Management Study, Long-Term, is the second phase and is scheduled to begin in fiscal year 1997. Its objective is to develop a long-term operations strategy for New Melones Reservoir. This study will negotiate a consensus among stakeholders concerning reservoir operation. The long-term operation of New Melones Reservoir is to be based on water availability by evaluating different year types, existing facilities, and changing demands for

agricultural, urban, and environmental purposes. If it is determined upon completion of the New Melones Water Management Study, Long-Term, that there are still unmet needs, a new planning study proposal would be developed to address these needs.

APPENDIX A

AMERICAN RIVER WATER RESOURCES INVESTIGATION

This Appendix includes information from the American River Water Resources Investigation to meet requirements under Public Law 102-575, Title 34, Section 3406(c)(2).

U.S. Bureau of Reclamation

American River Water Resources Investigation Findings Applicable to the American River/Folsom South Conjunctive Use Optimization Study

Final Report

November, 1995

MONTGOMERY WATSON

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ARWRI FINDINGS APPLICABLE TO THE OPTIMIZATION STUDY

This document describes American River Water Resources Investigation (ARWRI) findings that are applicable to the American River/Folsom South Conjunctive Use Optimization Study (Optimization Study). The two study areas overlap in southern San Joaquin County in the Central Valley of California.

Although the ARWRI does not cover the entire Optimization Study area, the ARWRI does include the valley floor, representing the majority of the Optimization Study area's water demands. The ARWRI is a programmatic study of two action alternatives designed to satisfy unmet water needs within a five county region. The ARWRI study included extensive data collection and water needs analyses. The results of these efforts are available to support subsequent investigations of the Optimization Study area.

OPTIMIZATION STUDY BACKGROUND

Purpose and Scope of Optimization Study

The Optimization Study was a joint project between Reclamation and CDWR to develop a long-term water use plan for the area between the Stanislaus and Calaveras Rivers. During the water use plan development, the Optimization Study would investigate alternative storage, release, and delivery regimes including conjunctive use, conservation strategies, exchange arrangements, and the use of base and channel maintenance flows to best satisfy Stanislaus River Basin (in-basin) and out-of-basin needs.

The San Joaquin County groundwater basin has a history of overdraft (groundwater withdrawal in excess of recharge). Surface water supplies are flashy--with large flows in some years and small flows in others. An integrated system of surface and groundwater delivery facilities could take advantage of the variable surface water flows. With such a system, users of groundwater would take delivery of surface water in years when excess surface water is available (wet years) "in lieu" of pumping groundwater to meet their demands. This would keep more water in the ground in these years. In dry years, when surface water is not available, users would return to pumping groundwater to meet demands. In these years of high flows, interim contract deliveries would be met to the extent possible. Wet year excess flows could be used in three ways: 1) to meet immediate demands "in lieu" of meeting those demands with groundwater, 2) to store in offstream surface water facilities for later "in lieu" use, or 3) to recharge the groundwater through percolation basins or through injection wells.

Reference to the Optimization Study

The Optimization Study is known by several names. Public Law 102-575, Section 3406(c)(2) refers to it as the Stanislaus River Basin and Calaveras River Water Use Program. The US Bureau of Reclamation (Reclamation) refers to it as the American River/Folsom South Conjunctive Use Optimization Study. Other reference names used by the US Fish and Wildlife Service (FWS) and the California Department of Water Resources (CDWR) include: the Stanislaus/Calaveras Conjunctive Use Study; the American River Conjunctive Use Study; the Stanislaus River Basin and Calaveras River Water Use Program; and the Stanislaus and Calaveras River Basins Water Management Study.

Optimization Study Area

The study area is located in central California along the western slope of the Sierra Nevada mountains. It includes portions of Alpine, Calaveras, Tuolomne, Stanislaus, and San Joaquin Counties. Major rivers and tributaries in the area include the Stanislaus River, Calaveras River, Tuolomne River, San Joaquin River, Mormon Slough, and Littlejohns Creek. The study area is bounded by the Calaveras River on the north, the lower San Joaquin River on the west, the Stanislaus and Tuolomne Rivers on the south, and the Sierra Nevada mountains on the east. A map of the study area is shown in Figure 1. The study area includes the Stanislaus River Basin, Stockton East Water District (SEWD), Central San Joaquin Water Conservation District (CSJWCD), and the Sharpe Army Depot. The definition of the Stanislaus River Basin conforms with Public Law 87-874 and the 1981 Record of Decision based on Reclamation's report entitled *Stanislaus River Basin Alternatives and Water Allocation;* (Reclamation, 1981).

Optimization Study Methodology

The Optimization Study was intended to evaluate conjunctive use alternatives for water from the Calaveras and Stanislaus Rivers using the 155 taf firm and interim contract water with SEWD and CSJWCD. Alternatives considered included evaluation of offstream storage at the proposed South Gulch Reservoir and at Farmington Reservoir. The districts would take delivery of up to 155 taf of Stanislaus River CVP contract water only during wet years and use groundwater and South Gulch or Farmington storage during dry years. This would, in concept, increase the volume of Stanislaus River water available during dry years which could be applied to other beneficial uses.

The CDWR and Reclamation had different goals concerning the Optimization Study. CDWR was seeking additional water for the State Water Project (SWP). Reclamation was seeking to optimize water use in the study area while honoring its contractual and agreement commitments. CDWR terminated its participation

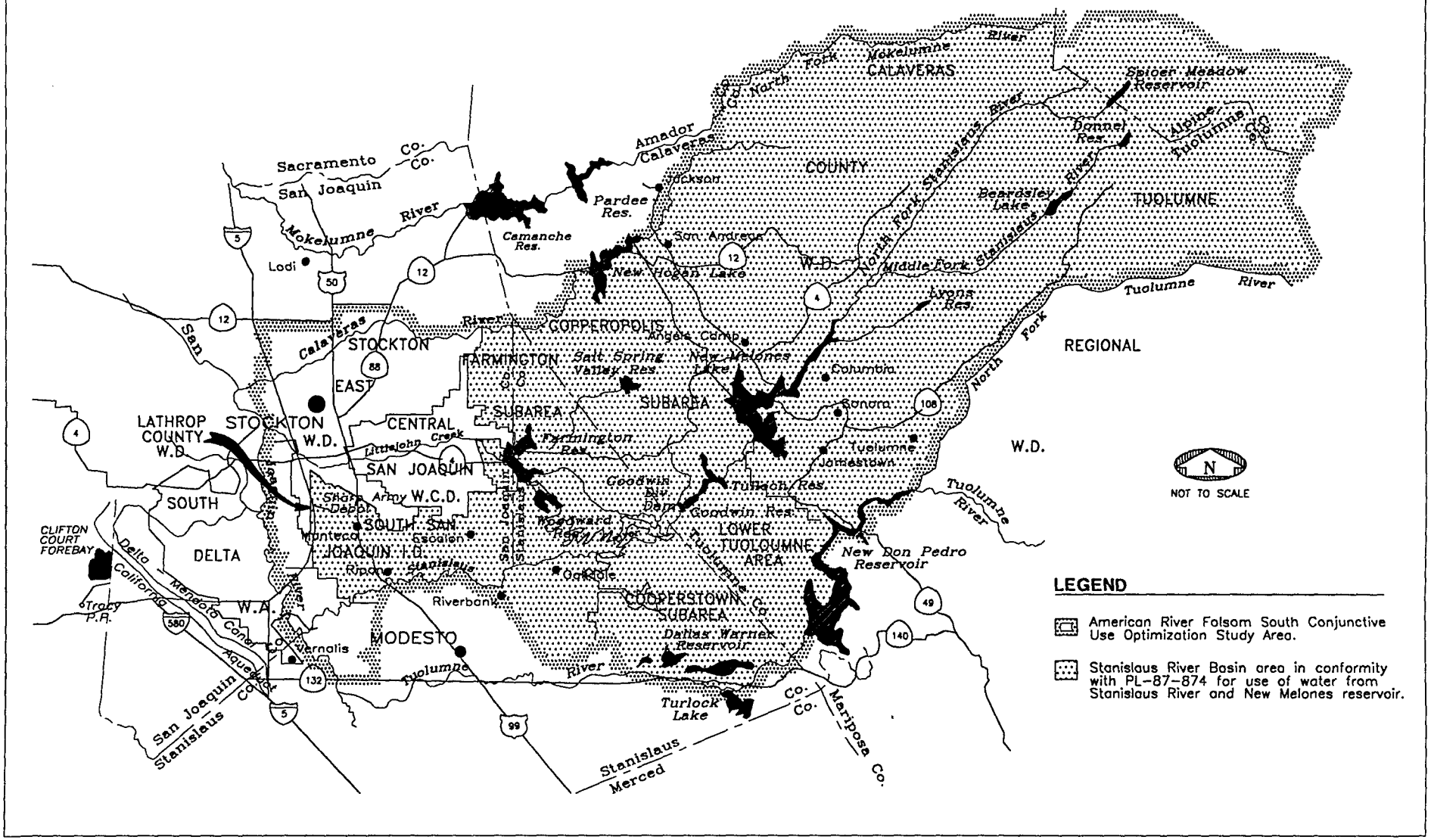

Figure 1
American River Folsom South
Conjunctive Use Optimization Study

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in the Optimization Study on March 3, 1995 since modeling studies indicated that no water would be available to augment the SWP yield, due to existing commitments, new requirements under Public Law [P.L.] 102-575, and the December 1994 Bay-Delta Accord. Owing to the ongoing New Melones Water Management Plan and the lack of funding in FY-96 for the Optimization Study, Reclamation decided to conclude activities on the study.

ARWRI BACKGROUND

Purpose and Scope of ARWRI Study

The purpose of the ARWRI study is to devise a means whereby future (year 2030) water demands are met. Water needs were analyzed (Reclamation, 1994), and alternatives to supply those needs were formulated (Draft Planning report, Reclamation, 1995) and evaluated under NEPA guidelines (Draft EIR/EIS, Reclamation, 1995).

Authorization and Guidance for ARWRI

Reclamation's participation in American River studies is authorized by the American River Basin Development Act of 1949 (P.L. 81-356, October 14, 1949). Congress provided initial appropriation for Reclamation to conduct an investigation of the water resources needs of the American River basin under the Energy and Water Development Appropriations Act of 1991 (P.L. 101-514, November 5, 1990). Reclamation and Sacramento Metropolitan Water Agency (SMWA) entered into an agreement on August 12, 1991. This agreement defines SMWA and the interests it represents as equal cost-sharing partners with Reclamation for this investigation. The agreement also identifies the roles and responsibilities of the agencies.

Status of ARWRI Study

The ARWRI is currently preparing a draft Planning Report and draft EIR/EIS for public release in December 1995. Reclamation will accept public comments on the Draft EIR/EIS and incorporate them into a final EIR/EIS to be released in Spring 1996.

ARWRI Study Area

The ARWRI study area includes the southwestern portion of Placer County, southeastern portion of Sutter County, western portion of El Dorado County, and most of Sacramento and San Joaquin Counties. The boundaries of the study area are illustrated in Figure 2.

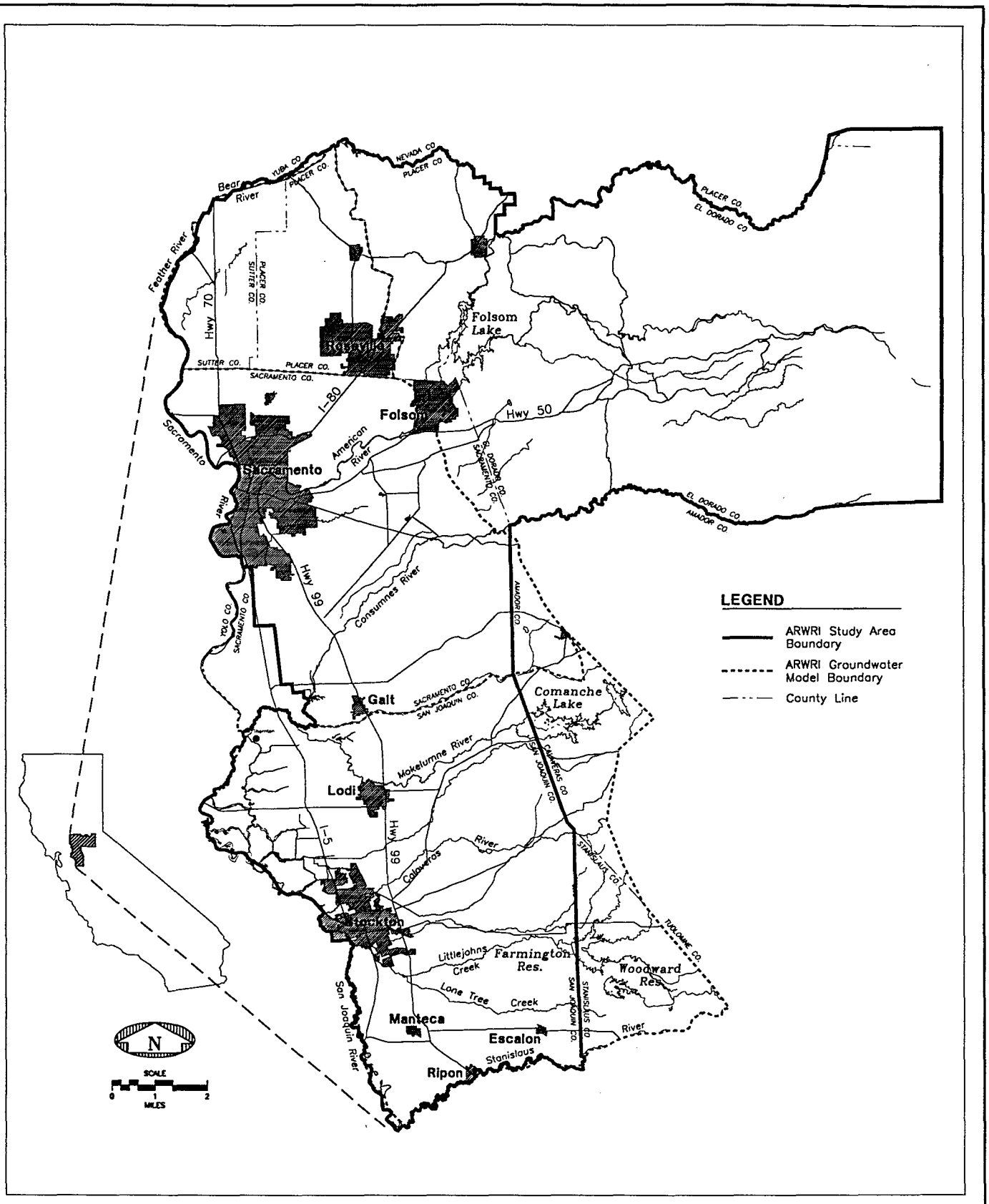

Figure 2
American River Water Resources Investigation (ARWRI)
Study Area

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ARWRI Analysis Methodology

Both integrated groundwater/ surface water models and surface water models were used to analyze the No Action and Action alternatives for the ARWRI study. The surface water model used for the San Joaquin and Stanislaus Rivers is SANJASM, which models the entire San Joaquin River and its tributaries. The PROSIM surface water model was used to simulate flows on the American and Sacramento Rivers as well as Delta outflows. Results from EBMUDSIM were used to estimate flows on the Mokelumne River. Each of the surface water models were used to develop river inflows at the boundaries of the integrated groundwater / surface water models (IGSM). The IGSM is described in a documentation report (Montgomery Watson, 1993).

ARWRI Assumptions and Related Studies

Water Rights Decision 1422 (D-1422) reserved conservation storage in New Melones Reservoir to provide 98.3 taf per year for preservation and enhancement of fish and wildlife resources in the Stanislaus River. D-1422 also set water quality standards for mean monthly total dissolved solids (TDS) of 500 parts per million (ppm) on the San Joaquin River at Vernalis. The 1994 Bay-Delta Accord set Bay-Delta flow requirements and amended the water quality standards at Vernalis to meet electrical conductivity (EC) values of 1 mmhos/cm (approximately 455 ppm TDS) from April to August, and 0.7 mmhos/cm (approximately 650 ppm TDS) from September through March.

The Stanislaus River assumptions for the ARWRI, as presented in Table 1, are as follows:

- OID/SSJID water rights settlement agreement are met first
- riparian uses are met
- instream flows of 98.3 taf per year are provided
- up to 70 taf is allocated to meet water quality needs at Vernalis, per the 1994 Bay-Delta Accord
- any remaining water is split between additional water for water quality, Bay-Delta flow requirements, and the CSJWCD water contract.

TABLE 1
Rules for Allocating New Melones Reservoir Releases for ARWRI Study
[SANJASM Run AR3]
(All values presented in thousands of acre-feet per year)

	Water Uses Met Regardless of Water Year Type				Water Uses Subject to Deficiencies Based on Hydrologic Conditions		
	OID/ SSJID	Stanis. R. Riparian Uses	Stanis. R. Instream Flows	Bay-Delta Water Quality	Bay-Delta Instream Flows	Add'l for Bay-Delta Water Quality	CSJWCD CVP Contract
Release Amount	≤ 600	48	98.3	70	50	30	49

The Central Valley Project Improvement Act (CVPIA) of 1992 water allocation of 800 taf for fish and wildlife habitat restoration purposes was not considered in the ARWRI investigation, and would therefore be an additional demand on the system beyond this study.

COMMON AREA

Location

The study areas for the Optimization Study and the ARWRI overlap in approximately 550 square miles of southern San Joaquin County (Figure 3). The common area includes: Stockton East Water District (SEWD), Central San Joaquin Water Conservation District (CSJWCD), and South San Joaquin Irrigation District (SSJID); the cities of Stockton, Manteca, Ripon and Escalon; a portion of Oakdale Irrigation District (OID); as well as approximately 110 square miles of independent lands (those not contained within water district boundaries).

Study Approach Differences

Although the ARWRI and Optimization Study cover different areas, the common area is an important part of both studies, for which each study evaluated potential conjunctive use opportunities. Although conjunctive use is the main component for both studies, additional sources of surface water were evaluated for conjunctive use in the ARWRI. The Optimization Study evaluated use of only Stanislaus River, Calaveras River, and Littlejohns Creek supplies; while the ARWRI evaluated water availability in the Sacramento, American, Feather, Mokelumne, Calaveras, and Stanislaus Rivers and Littlejohns Creek.

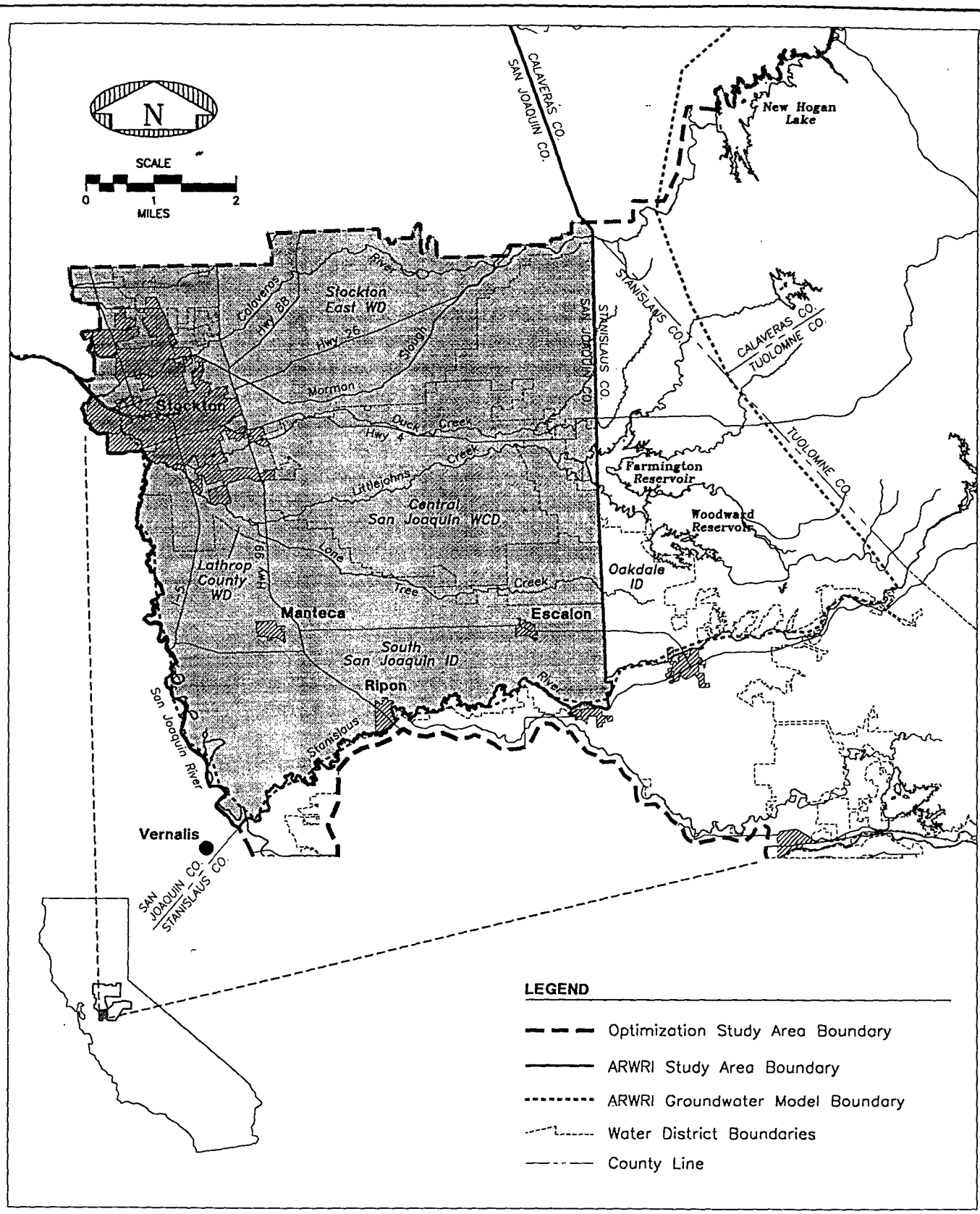

Figure 3
American River Water Resources Investigation (ARWRI) and American River/Folsom South Conjunctive Use Optimization Study Common Area Features

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Different environmental conditions were assumed. The ARWRI study assumptions for New Melones releases included 98.3 taf to meet Stanislaus River instream flows, up to 100 taf per year of dedicated water to meet San Joaquin River water quality standards, and 50 taf to meet Bay-Delta pulse flows for fish. CVPIA requirements for 800 taf of dedicated water were not considered in the ARWRI evaluation of surface water availability. CDWR's Optimization Study assessment of surface water availability for conjunctive use was affected by changing conditions on the Stanislaus River. These changed conditions include: increased fish flow requirements under the 1987 Reclamation-California Department of Fish and Game (CDFG) interim agreement, and the new 1994 Bay-Delta Accord water quality standards.

Analysis Area Covered

The surface water and groundwater models used in the ARWRI, cover a larger area than the study area itself. The surface water model, SANJASM, incorporates the entire San Joaquin River system from Millerton Lake to the Cosumnes River. The groundwater model includes the groundwater basin East of the San Joaquin River and North of the Stanislaus River which includes portions of Stanislaus and Calaveras Counties which are outside of the ARWRI study area. Water demands and supplies were computed for the entire groundwater model area, but project alternatives and related impacts were only evaluated for the study area. Therefore, only the ARWRI analysis results for the area in common with the Optimization Study is presented in this report.

Physical Conditions

From the ARWRI, it was found that approximately seventy percent of the common area is currently used for agriculture, ten percent is urban and the remaining twenty percent is left as native vegetation. Population is currently at 220,000 and is expected to almost double to 400,000 people by the year 2030 according to the October 1993 CDWR report, *Urban and Agricultural Water Demands In the American River Study Area* (CDWR, 1993). These population estimates are based on the California Department of Finance Population Projections, dated April 1993.

The common area lies wholly within California's Central Valley, which is characterized by hot, dry summers and cool, mild winters. Average annual rainfall in this area is approximately 14 inches over the flat valley floor. Geomorphic features in the area consist of alluvial fans and valley floor sediments which contain well drained to imperfectly drained soils.

The Calaveras, Stanislaus, and San Joaquin Rivers flow across the valley floor through the common area, and are the main sources of surface water supply. The Eastern San Joaquin groundwater basin, which is a portion of the extensive Central Valley groundwater aquifer system, underlies the common area. Water

from this aquifer system is widely used throughout the area and accounts for approximately 63 percent of the total water use (results of groundwater modeling studies conducted for the ARWRI study).

The Eastern San Joaquin Basin (as defined in CDWR, 1980) is "subject to critical conditions of overdraft." This means that historically, groundwater withdrawn from the basin has exceeded the rate of recharge to the basin resulting in severe impacts on water levels and water quality. Water levels have been declining and the basin is effectively being "mined". The overdraft condition may be pulling in poor quality water and causing "saline intrusion". Saline intrusion occurs when groundwater gradients cause groundwater to flow from a source of subsurface saline water towards and into an area previously containing subsurface fresh water. Saline water has been intercepted in wells from time to time in Eastern San Joaquin County over the past 30 years. The underground saline intrusion in this area appears to be the result of either saline water migrating from the west into the fresh water of the aquifer, or saline water in isolated pockets which is periodically encountered by pumping wells, or some combination thereof.

Groundwater flow direction is toward a cone of depression underlying the area east of the City of Stockton, centered just south of the Calaveras River. Groundwater flow direction throughout the common area is toward this cone of depression, which is located near the center of the common area.

PRESENT WATER DEMAND AND SUPPLY

Present Water Demand

For the purposes of the ARWRI, water demands are summarized in two categories: agricultural, and municipal and industrial (M&I). Total demand in the common area is 840 taf per year (computed as the average of 1985-1990 historical estimates, see Table 2). Agriculture accounts for approximately ninety percent (745 taf per year) of the total water demands. Urban demands account for approximately ten percent (95 taf per year) of the total.

Present Water Supply Delivered

Surface water from the Calaveras, Stanislaus, and San Joaquin Rivers supplies approximately 42 percent of the total water use in the area, according to modeling results as part of the ARWRI study. Annual average groundwater pumping of 484 taf meets the remaining 58 percent of the current demand in the common area. Groundwater levels have been declining and will continue to decline with this rate of pumping.

Surface water is diverted from the Calaveras River to SEWD currently at about 80 taf per year on an average annual basis (Table 2). The City of Stockton takes

delivery of approximately 30 taf of this surface water from SEWD's water treatment plant. Annual Stanislaus River diversions include up to 600 taf for South San Joaquin Irrigation District (SSJID) and Oakdale Irrigation District (OID). However, the portion of OID that is within San Joaquin County (within the ARWRI area) only uses about 26 taf annually and SSJID presently uses approximately 200 taf. Although OID and SSJID surface water use is 226 taf, because of losses through the conveyance system, their river diversions are greater, at approximately 236 taf.

TABLE 2
Common Area Present Water Demand and Water Supply
Average Historical Supply (1985-1990)
(All values presented in thousands of acre-feet per year)

AREA	WATER DEMAND		WATER SUPPLY	
	M&I [1]	Ag [2]	Ground-water [3]	Surface water [4, 6]
Stockton East Water District	33	149	132	50
Central San Joaquin WCD	4	148	152	0
South San Joaquin ID	4	220	24	200
Oakdale ID (Portion within San Joaquin Co.)	1	30	5	26
City of Stockton	42	50	62	30
Cities of Manteca, Ripon, and Escalon; and Surrounding Agricultural Lands	8	53	20	41[7]
Independent Areas [5] San Joaquin River	3	95	89	9
Total	**95**	**745**	**484**	**356**

[1] M&I demand was estimated using urban acreage and water use rates.
[2] Agricultural demand was estimated with consumptive use computations using crop acreage.
[3] Groundwater was computed as total demand less surface water supply.
[4] Surface water supply is from city and districts' records.
[5] Independent areas are those not contained within a water district boundary.
[6] Surface water supplies represent amounts used to meet demands, not the amount of surface water diverted from the rivers.
[7] Includes riparian diversions from the Stanislaus River and deliveries from SSJID (much of the agricultural land around these cities is part of the SSJID service area).

Presently, CSJWCD has a firm CVP water service contract with Reclamation for 49 taf annually. However, CSJWCD had not taken delivery of any water under this contract until 1995. Annual Riparian diversions from the Stanislaus River

downstream of Goodwin Dam amount to approximately 48 taf, of which about one half are used in San Joaquin County. About 9 taf per year of San Joaquin River water is diverted for independent riparian water users along the eastern bank of the river in San Joaquin County (this value was estimated using the IGSM model). Total average surface water deliveries to the common area presently amount to approximately 356 taf per year.

FUTURE WATER DEMANDS

Estimated Future Agricultural and M&I Demands

According to the 1993 CDWR's ARWRI demands report (CDWR, 1993), population in the common area is expected to almost double by the year 2030. As indicated in the 1993 CDWR report, urban water demands will double to 201 taf per year, while agricultural demands will decrease to 608 taf per year (see Table 3). Total 2030 agricultural and M&I water demands are estimated at 809 taf per year, which is 31 taf less than the 1985-1990 historical average water demand.

Environmental Demands

Instream flow and Bay-Delta Water Quality Requirements
As described in the ARWRI Assumptions and Related Studies section of this report, D-1422 and new Bay-Delta water quality and instream flow standards place a large environmental demand on the Stanislaus River. These demands, as assumed for the ARWRI study, require up to 248 taf per year from New Melones Reservoir.

Saline Intrusion Program (SIP)

As part of the ARWRI, unmet water needs include supplies required to eliminate saline intrusion in the Stockton area. An estimated 70 taf per year of additional surface water is required for groundwater recharge to alleviate saline intrusion groundwater problems in this area.

TABLE 3
Common Area Future Water Demand (Year 2030)
and Future Water Supply (under ARWRI Alternatives)
(All values presented in thousands of acre-feet per year)

ARWRI Alternative	WATER DEMAND				WATER SUPPLY				
	M&I	Ag	SIP	Total	Ground water	Surface water			Total
						Available Supplies	Waste-water	Addit'l Supply	
No Action Alternative	201 [1]	608	0	809	473	336	0	0	809
Conjunctive Use Alternative	191 [2]	608	70	869	383	336	15	135	869
Auburn Dam Alternative	191	608	70	869	383	336	15	135	869

1 Reflects 10 percent reduction in M&I per capita demand due to conservation
2 Reflects 15 percent reduction in M&I per capita demand due to conservation

FUTURE WATER SUPPLY

Rights / Entitlements

For the purposes of the ARWRI No Action Alternative, future water supply is estimated as the lesser of known entitlements and diversion capacity. Water rights and entitlement amounts are presented in Table 4.

Calaveras River

Calaveras River water would be allocated as follows. First priority of 12.65 taf goes to riparian agricultural users within SEWD, second priority of 20 taf is diverted through the water treatment plant to M&I users, third priority of 48 taf is diverted for agricultural uses, and the remaining up to 17 taf is routed through the treatment plant to M&I users.

Stanislaus River

On the Stanislaus River, SSJID and OID hold various water rights recognized by a settlement agreement for up to 600 taf per year. CSJWCD has CVP water service contract for 49 taf on the Stanislaus River. SEWD and CSJWCD hold interim 40-year CVP water service contracts with Reclamation for 75 taf and 31 taf respectively for a total of 106 taf, which expires in 2020. Riparian water rights along the Stanislaus River amount to approximately 48 taf [estimated as recent

historic use of 74.5 taf of active and dormant riparian rights downstream of Goodwin Dam (according to D-1422)].

San Joaquin River

San Joaquin River independent riparian rights utilize an estimated 9 taf per year (ARWRI study model).

TABLE 4

Common Area Water Rights and Entitlements

(All values presented in thousands of acre-feet per year)

River System	Diversion Name	Known Water Entitlement	Estimated Water Entitlement	No Action Maximum Diversion
Calaveras River	SEWD (1) Riparian	12.7		12.7
	(2) Municipal	20		20
	(3) Agricultural	48		48
	(4) Municipal	17		17
	Subtotal	97.7		97.7
San Joaquin River	Riparian		9	9
Stanislaus River	SSJID - Rt Bank	300		300
	OID - Rt Bank (in study area)	32 [1]		32
	CSJWCD	49		49
	Riparian (in study area)		24	24
	Subtotal	381		405

[1] OID Stanislaus River entitlement is calculated as the portion of their 300 taf entitlement utilized within San Joaquin County in the ARWRI area..

Estimated Future Needs

Water need was estimated for the ARWRI as the amount of additional surface water supplies necessary to reduce groundwater pumping to achieve "stabilized" groundwater conditions, and to mitigate the underground "saline intrusion". To halt saline intrusion (as described in the Present Conditions section of this

report), a need of 70 taf per year was estimated through groundwater modeling efforts for the ARWRI.

In order to "stabilize" groundwater levels, the groundwater withdrawal rate is limited to the groundwater replenishment rate, thus targeting an average zero change in groundwater storage over a number of years. This stabilized condition would halt further groundwater overdraft, so that the groundwater basin would not further degrade. Future need was computed from a given 2030 water demand of 809 taf per year plus 70 taf per year demand for saline mitigation, a "stabilized" groundwater withdrawal rate of 383 taf per year, and an average surface water supply availability of approximately 336 taf per year. An additional 5 percent urban conservation reduces the demand by 10 taf, and reclaimed water is used to meet 15 taf, leaving an average annual unmet need of 135 taf in this portion of San Joaquin County.

ALTERNATIVES EVALUATED IN ARWRI

This section describes the No Action Alternative, and the two action alternatives developed by the ARWRI in terms of their affects on the common area.

No Action Alternative

The No Action Alternative is designed to provide a basis for comparison of the proposed ARWRI action alternatives. Surface water supply is limited to the lesser of entitlement, demand, existing diversion capacities, and available river flows. Total surface water supply under the No Action Alternative is 336 taf per year. Groundwater is assumed to be pumped to supply the remaining 473 taf of demand. In the No Action Alternative, 2030 demands are met at the expense of groundwater storage and groundwater quality.

Action Alternatives

Both ARWRI action alternatives include identical conservation and wastewater reclamation components, and both alternatives were designed to "stabilize" groundwater storage. These common factors are described below.

Conservation and Reclamation Components

For each action alternative, municipal and industrial (M&I) conservation is assumed at an additional 5 percent above CDWR's estimates (CDWR, 1993) which assumed a 10 percent reduction from 1990 per capita M&I usage, for a total of 15 percent conservation. Therefore, M&I demand was reduced from 201 taf per year in the No Action Alternative to 191 taf per year for the two action alternatives.

An identical water reclamation component is included in each of the action alternatives, in which 15 taf per year of the North Stockton waste water treatment plant effluent is assumed to be reapplied to agricultural lands in the area.

Stabilized groundwater

Groundwater supply is limited to that which is available under "stabilized" conditions, that is, the condition under which the groundwater withdrawal rate does not exceed the rate of groundwater replenishment. The stabilized rate of groundwater withdrawal in this area was found to be approximately 383 taf per year.

Conjunctive Use Alternative

In the Conjunctive Use Alternative, excess available flows from the Sacramento, American, Feather, Mokelumne, and Calaveras Rivers and Littlejohns Creek are considered for diversion to meet demands, and to recharge the groundwater basin. Excess flows are available in wet and average years and during months of high flows. Large diversions are made during the wet years and reduced, or no diversions are made during dry years. During dry years, demands are satisfied by groundwater pumping.

Under this alternative, excess flows on the Sacramento and/or American Rivers of 88 taf per year are diverted and conveyed to San Joaquin County. An average of 26 taf excess on the Mokelumne, 1 taf on the Calaveras, and 16 taf from Littlejohns Creek were also identified as available for conjunctive use. 50 taf of Stanislaus River water was also included, which could come from water rights transfers or contract deliveries. A total of 181 taf of water was found to be available on an average annual basis for conjunctive use in San Joaquin County. Approximately 135 taf of this water is assumed to be used in the common area.

Water availability is limited to the existence of excess flows, and diversion capacities. Surface water would be 1) used in lieu of pumping, and / or 2) directly recharged into the aquifer through recharge basins and injection wells. Regions receiving the surface water in San Joaquin County include Woodbridge ID, North San Joaquin Water Conservation District, SEWD, City of Stockton, and CSJWCD.

Storage Facilities

A component of storage to hold conjunctive use surface water must be made available for water greater than that which can be used to meet immediate demands for in-lieu conjunctive use. The stored water can be used to meet later demands. Surface or subsurface storage could be made available for this purpose.

Surface water storage options considered in the environmental impacts analysis for the ARWRI as part of the action alternatives include an enlarged Farmington Reservoir, or new South Gulch and Duck Creek Reservoirs. Subsurface storage options, that could be developed to achieve the same goal as reservoirs, include the use of recharge ponds and injection wells to convey the water into the subsurface for later use as groundwater. Injection wells and recharge ponds are considered variations of the surface water facilities analyzed in the ARWRI EIR/EIS. Surface storage or subsurface storage is needed to utilize the excess surface water flows to meet project objectives. It is not the intention of the ARWRI to recommend a specific combination to implement. Site specific plans and environmental documentation would evaluate the specific storage alternatives on a local level.

Surface water storage options considered in the ARWRI are presented below.

Farmington Reservoir. This component involves expanding the flood control facility east of Stockton to store up to 160 taf of floodwater and diverted Stanislaus River water. The diverted water would utilize the existing upper Farmington Canal, owned by SEWD, as well as new facilities.

South Gulch Reservoir. This reservoir is proposed for offstream storage adjacent to and south of the Calaveras River down stream from New Hogan at the San Joaquin/ Calaveras County line. This facility would store up to 140 taf of Calaveras River water, and would have an estimated yield of 65 taf per year.

Duck Creek Reservoir. This component is a proposed offstream Reservoir on a small tributary north of the Calaveras River in eastern San Joaquin County. The reservoir would store up to 200 taf of surplus Mokelumne River water, and have an estimated yield of 65 taf per year. Water would be delivered from Pardee (and potentially Comanche) Reservoir through a new pipeline that would parallel the Mokelumne River Aqueduct.

Conclusions

The Conjunctive Use Alternative effectively meets 2030 level demands in the ARWRI study area including those to stabilize groundwater levels and meet saline intrusion mitigation objectives. This alternative provides annual water supply for groundwater recharge specifically for saline mitigation. An average of 135 taf of additional surface water is made available under this alternative. The long-term average groundwater levels remain at current (1990) levels through a 70-year model simulation while meeting 2030 demands.

Costs-Benefit Analysis

The cost-benefit analysis is currently being developed for the action alternatives, and will be shown in the final ARWRI planning report and EIR/EIS. The

analysis will include the various diversion structures, treatment facilities, distribution lines, storage and groundwater recharge facilities.

Auburn Dam Alternative

Conservation and Reclamation Components

A 15 percent conservation component and 15 taf reclamation component are assumed, as explained in the Conjunctive Use Alternative section.

Stabilized Groundwater Levels

Groundwater supply is limited to "stabilized" conditions (383 taf per year). Therefore the same amount of conjunctive use surface water (135 taf per year) is needed to meet demands as in the conjunctive use alternative.

Conjunctive Use of Surface Water and Groundwater

Similar to the conjunctive use alternative, excess available flows from the Sacramento, American, Mokelumne, and Calaveras Rivers and Little John's Creek are considered for diversion to meet immediate demands, or recharge to the groundwater basin. However the difference between the two action alternatives is that operation of Auburn Dam would regulate the river flows such that each year's diversion is closer to the average annual diversion. Surface water deliveries under the two alternatives have the same annual average, but are different from month to month. Therefore, all of the diversion, treatment and delivery structure capacities are smaller with the Auburn Dam Alternative.

Conclusions

The Auburn Dam Alternative effectively meets 2030 level demands in the ARWRI study area including those to stabilize groundwater levels and meet saline intrusion mitigation objectives. As in the Conjunctive Use Alternative, the Auburn Dam Alternative provides annual groundwater recharge specifically for saline mitigation, and a total average of 135 taf of additional surface water is made available under this alternative. The long-term average groundwater levels remain at current (1990) levels through a 70-year model simulation while meeting 2030 demands.

Costs-Benefit Analysis

This alternative includes conjunctive use, but for a smaller area with a lower volume of water than in the Conjunctive Use Alternative. Therefore, the cost of the diversion, treatment and delivery systems will be less, but the cost of the Auburn Dam will be added. A cost-benefit analysis for the ARWRI Action

Alternatives is currently underway and is expected to be completed for inclusion in the final ARWRI documents.

POTENTIAL FUTURE WATER SUPPLIES TO MEET VERNALIS REQUIREMENTS

The measures described in this section could contribute to solving certain San Joaquin River water quality and flow problems, while relieving New Melones release constraints and Stanislaus River flows so that more water would be available for delivery to the ARWRI study area.

Present Demands on System

Presently, New Melones Reservoir releases are used to meet Bay-Delta water quality and flow standards, as well as Stanislaus River instream flow requirements. These releases total 168 to 248 taf per year under the ARWRI assumptions (as described in the ARWRI Assumptions and Related Projects section of this report), but could increase to more that 450 taf per year. These higher releases could result from revised Stanislaus River instream flow, and Bay-Delta water quality requirements, CVPIA's dedicated 800 taf for fish and wildlife, and CVPIA's anadromous fish doubling goals.

Given these release requirements, the availability of water to make deliveries to CSJWCD and SEWD under their interim water service contracts is less than at the time the contracts were executed. However, water does appear to be available for delivery in some years under CSJWCD's 49 taf contract.

Options to Increase the Quantity of Stanislaus River Water Available for In-basin Use

Several options to using only New Melones operations to satisfy the out-of-basin needs described above have been suggested through public participation in the ARWRI scoping and other public involvement activities. Although none of these options were considered as part of the ARWRI alternatives and no analysis was performed, the basic concept of the options are presented below.

1. Acquire replacement supplies for CSJWCD and SEWD to reduce groundwater pumping in those districts. This water could come from fallowing of agricultural lands, or through conservation of applied water.

2. Add monitoring points and standards on the San Joaquin River upstream of the Stanislaus River confluence, e.g. at the Tuolumne and Merced River confluences. This would lessen the burden borne by the Stanislaus River by diluting and supplementing San Joaquin River flows upstream of the Stanislaus River.

3. Implement a recirculation project. During wet periods, when San Joaquin River quality at Vernalis is within standards, pump water from the delta to store in San Luis Reservoir. During dry years, release this water from San Luis and convey it to the San Joaquin River. This also would lessen the burden borne by the Stanislaus River by diluting and supplementing San Joaquin River flows upstream of the Stanislaus River.

4. Manage west side drainage to reduce the quantity of poor quality drainage effluent entering the San Joaquin River. This can be achieved by completing the west side drain, retiring agricultural lands, or by treating the drainage water.

AREA OF ORIGIN STATUTES

This section explaining "area of origin statutes" is presented to explain how some of the uncertainties associated with CVPIA implementation and the Bay-Delta water rights process may be offset. These statutes suggest that some level of protection/ priority exists for water rights required to satisfy the unmet needs of the ARWRI service area. Although the ARWRI alternatives do not depend on the existence of area of origin water rights, these statutes may offer an independent legal basis for the recommended new and expanded diversions, which are assumed to be supported by new and existing water rights and water service contracts.

The California Water Code contains a number of sections addressing certain rights and obligations of areas in which water originates. These statutes, known variously as the "area of origin statutes", or the "watershed protection act(s)" can be summarized as follows:

§ 11460 - "a watershed, or other area in which water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived [by construction or operation of the State Water Project] directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein."

§ 11128 - Applies § 11460 to operation of the CVP.

§§ 12000 - 12205 - Applies similar restrictions to exports from the Sacramento-San Joaquin Delta.

These statutes have not yet been interpreted by any court, and their effect and applicability are unknown. However, the statutes suggest that areas in which water originates, such as the ARWRI study area, may hold something akin to

reserved water rights, senior to State Water Project and Central Valley Project water rights, in amounts up to those required to meet their beneficial needs.

If true, these area of origin rights would have priority over existing CVP and SWP water rights, requiring that CVP/SWP diversions cease if such diversions would deprive the study area of the prior right to waters needed to meet the beneficial uses in the ARWRI study area. Of course, in the driest years and months, CVP and SWP water rights typically cannot be exercised due to lack of streamflow. At these times, CVP and SWP deliveries are made with water stored previously during wet periods. Under these dry year conditions, an immediately prior area of origin right could be of no value, since water is physically unavailable. The question of whether an area of origin is entitled to water previously diverted by the SWP or CVP remains unanswered.

RELATED PENDING LITIGATION

Various parties in San Joaquin County recently brought suit against the California State Water Resources Control Board (SWRCB) alleging, among other things, various violations of certain area of origin statutes in connection with the SWRCB's May 1995 order concerning implementation of the December 1994 Bay-Delta Accord. The order modified CVP and SWP diversion permits to facilitate the Accord. The suit claims that these modifications permit the CVP and SWP to export more water, while decreasing the volume of water available to San Joaquin County, an area with unmet need where water originates.

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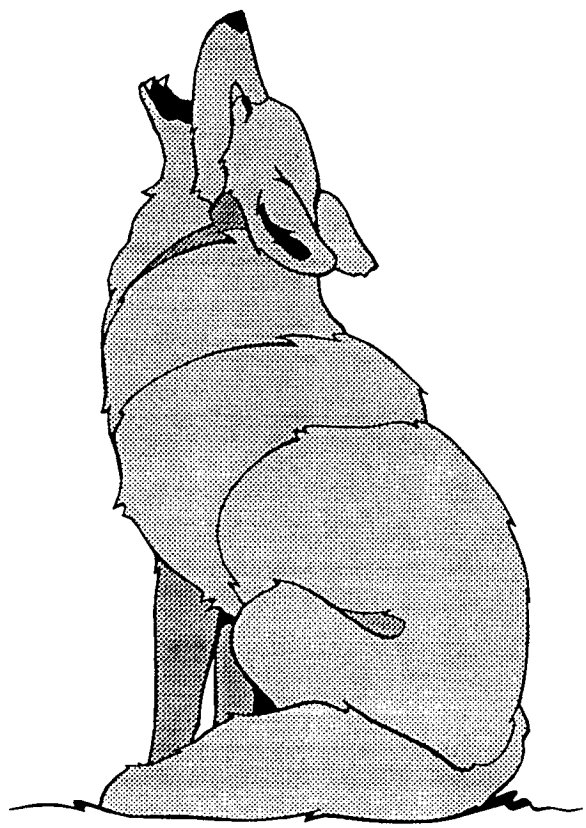
APPENDIX B

HEP TEAM REPORT

The American River/Folsom South Conjunctive Use Optimization Study is known by several names. The U.S. Fish and Wildlife Service (FWS) has referred to it by three names: the Stanislaus/Calaveras Conjunctive Use Study; the American River Conjunctive Use Study; and, the Stanislaus River Basin and Calaveras River Water Use Program. Public Law 102-575, Section 3406(c)(2) refers to the study as the Stanislaus River Basin and Calaveras River Water Use Program. This is the name FWS now formally uses. FWS has titled the HEP Team Report under the name Stanislaus River Basin and Calaveras River Water Use Program. This name was not changed.

STANISLAUS RIVER BASIN AND CALAVERAS RIVER WATER USE PROGRAM

HEP Team Report



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March 1995

Acknowledgments

The studies described in this report were completed as part of a cooperative Stanislaus River Basin Water Use Program, involving the Bureau of Reclamation, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the California Department of Water Resources.

An interagency Habitat Evaluation Procedures (HEP) team was composed of Fish and Wildlife Service biologist Marla Macoubrie (HEP team coordinator and principal author), Department of Fish and Game biologist, Laurie Briden, and Department of Water Resources environmental specialist, Michael Cooney.

Project direction and administration was provided by Fish and Wildlife Service Branch Chief John Brooks and Assistant Field Supervisor Jini Scammell-Tinling. David Lewis served as Bureau of Reclamation program manager and principal Reclamation contact. Teresa Geimer acted as project coordinator for the Department of Water Resources throughout this investigation.

Many others contributed to the completion of this report, especially overall support, gathering field data or reviewing parts of the document pertinent to their expertise: Fish and Wildlife Service biologists Jody Brown, Roger Guinee, Lori Renik, Meri Moore, Steve Schoenberg, Michael Aceituno, and Gerry North and botanists Steve Caicco, Ken Fuller, Kirsten Tarp, and Elizabeth Warne; Carol Sakamoto of the Bureau of Reclamation; Department of Fish and Game personnel Laura E. Briden, Brad Burkholder, Joe Croteau, Jim Machedo, Debbie Thatcher, Laureen Thompson and Steven Baumgartner; and Department of Water Resources personnel Debra Bishop, Dona Calder, James Upholt, and Twylla Winslow.

Vince Reidman, Bureau of Reclamation biologist in Denver, Colorado, provided technical review throughout the HEP process. Bart Prose, Fish and Wildlife Service office HEP coordinator, provided invaluable insight and guidance throughout the process. The Fish and Wildlife Service would also like to thank photogrammetrists Ellen Kachadorian and Juan Escobar at Department of Water Resources, for digitizing the aerial photographs and preparing study maps.

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HABITAT EVALUATION PROCEDURES METHODOLOGY

The purpose of this wildlife habitat suitability study is to determine the existing terrestrial conditions along the Stanislaus River for selected wildlife species. The analysis utilizes the Habitat Evaluation Procedures (HEP), developed by the U.S. Fish and Wildlife Service in the early 1970's, to assess the quantity and quality of fish and wildlife habitats and to quantify changes resulting from land and water development projects or project re-operations.

HEP documents baseline conditions of habitats as a gauge for estimating effects of proposed habitat modifications and can provide information for two types of habitat comparisons: 1) the relative values of different areas at the same time and 2) the relative values of the same area at future points in time. HEP can be involved in all project phases including project planning, impact assessment, mitigation and compensation of impacts, and habitat management.

HEP is a habitat-based evaluation methodology used to quantify 1) baseline wildlife habitat values; 2) impacts from the proposed actions; and, 3) gains in habitat values on mitigation areas with management. HEP is based on the assumption that habitat quality and quantity can be numerically described in terms of habitat units.

Advantages of HEP are that it is 1) standardized for consistency and repeatability, 2) interdisciplinary for addressing a broad range of resource issues and concerns, 3) comprehensive in analysis of habitat impacts, and 4) flexible in level of detail used in applications. HEP quantifies impacts in terms of area and quality and requires that all phases of a study be well documented for methods, processes, and assumptions.

Habitat quantity is easily measurable. Although many techniques exist for quantifying habitat quantity, the one most often used relies on aerial photography. Computer generation of habitat maps is then achieved.

Habitat quality is more difficult to determine and differs from one species to another. The HEP team determines which species or group of species using existing habitats will most effectively characterize impacts from a proposed project alternative. For each evaluation species, models are located, modified, and/or created to assess habitat suitability in terms of cover, water, food, and reproduction requirements. After a review of species currently associated with the lower Stanislaus River, fifteen evaluation species were selected for this study.

During pre-field studies the HEP team members drafted procedures for data collection that were used during the 1994 spring field season. Habitat quality for a given evaluation species is assigned through use of a Habitat Suitability Index (HSI). The HSI values vary from zero to one and measure how suitable the habitat if for a particular species when compared to the optimum habitat. The HSI value multiplied by acres of a habitat type equals Habitat Units (HU), and HU's are the numerical basis of the HEP analysis.

Once project alternatives are established, impact assessment is performed by quantifying HSI values at several points in time over the life of a proposed project or management action. These points in time are known as "Target Years," and they are selected for years in which changes in habitat conditions can be reasonably defined. In every HEP analysis, there must be a Target Year 0 (TY0), which represents the baseline conditions, Target Year 1 (TY1), which is the first year habitat conditions are expected to deviate from baseline conditions, and ending Target

Year which could be 5, 10, 20 or more years after Target Year 0, depending on the objectives of the analysis and the life of the project.

Evaluation species' HSI's and habitat acreage are required for all Target Years. Acreage at TY0 is termed "baseline". Impact assessment is conducted by analyzing, year by year, habitat conditions and impacts over the life of a project by comparing HU's from two scenarios. These scenarios are 1) Future-With-Project and 2) Future-Without-Project. For each scenario, HU's are determined for each and every Target Year, and the HU's are integrated over the life of the project in an annualization process. Impact assessments are calculated using the annualized average HU's, known as Average Annual Habitat Units (AAHU). The net impact of a proposed project is calculated by subtracting the Future-Without-Project AAHU's from Future-With-Project AAHU's ($AAHU_{with}$ - $AAHU_{without}$). This process is performed for impact assessment on project lands and management actions on mitigation lands because both are in essence a "project". The ratio of the net change in AAHU's for the project area, with and without management, multiplied by the size of the candidate management area, defines the number of acres necessary to offset project losses.

Assumptions

The following general assumptions are necessary for the proper use of HSI models:

- HEP is a suitable methodology for quantifying direct impacts to wildlife habitats;
- quality and quantity of wildlife habitat can be numerically described using the indices derived from the HSI models and the associated Habitat Units;
- the HEP assessment is directly applicable only to the selected evaluation species;
- HSI models are hypotheses based on available data;
- HSI models are conceptual models and may not measure all ecological factors that affect the quality of a given habitat type for the evaluation species; and
- the HSI value for the evaluation species is a measure of habitat quality that is assumed to be linearly related to carrying capacity of some other response measure for the evaluation species.

Purpose of Study

The HEP team developed the following HEP study goals and objectives, study area delineation, study reaches, covertype/habitat types, evaluation species, and field sheets.

Resource Objectives

The HEP study of the wildlife resources of the Lower Stanislaus River was designed to achieve the following objectives:

- Determine baseline habitat conditions for selected evaluation species;

- address impacts and benefits of the Stanislaus River Basin - Calaveras River Water Use Program on the Lower Stanislaus River; and
- establish mitigation measures and areas within the Stanislaus River riparian corridor.

Resource Goals

- Consider measures which protect and restore natural channel and riparian habitat values through habitat restoration actions, modifications to Central Valley Project operations, and implementation of supporting measures.
- Protect, restore and enhance wetland and riparian habitat and biodiversity for associated wildlife species of the lower Stanislaus River.
- Develop statistically valid supportive data to improve scientific understanding, and evaluate the ecologic and hydrologic effects of existing and alternative operations, both public and private, on the lower Stanislaus River.
- This study shall not conflict with goals of other studies to increase anadromous fish populations on the Stanislaus River.

HEP STUDY AREA

The study area encompasses parts of Calaveras, Tuolumne, Stanislaus, and San Joaquin counties (See Appendix). The HEP study area is approximately 10,311 acres in size, and spans 59 river miles along the Stanislaus River from Goodwin Dam to its confluence with the San Joaquin River.

Width of the study area was chosen to generally conform to the modern riparian corridor. Except for the canyon reach where width is loosely rim to rim, width of the study area was defined as 1500 wide--750 feet from the river's center line. As New Melones Dam controls modern flood flows, the entrenched stream channel leaves a relatively small flood plain and narrow riparian corridor. On the high terraces levees, agriculture and urban development have replaced much of the old floodplain.

Reach 1--Canyon Reach

Reach Length:	River mile (RM) 59-55, total of 4 RM's. Goodwin Dam (RM 58.2) to Covered Bridge (approx RM 54.5) at Knights Ferry
Reach Width:	Elevation at 400 foot line, essentially canyon rim-to-rim
Cover types:	Digger Pine--Blue Oak Woodlands, Valley Foothill Riparian, Annual Grassland, Riverine, and Rockland

The Stanislaus River flows through a narrow, precipitous bedrock canyon. This gorge is characterized by nearly vertical walls and rock outcrops. This segment has a relatively steep

gradient (2.0%). Vegetation cover types in the gorge are primarily blue oak woodland and digger pine dotted with grasslands, especially on the high terraces, and a thin line of riparian cover type. A diversion canal runs high along the left bank (looking downstream). The area has ideal habitat for bats. Thirty woodlands and eleven grasslands were delineated in this reach. The study width here was chosen to be from canyon rim to canyon rim, but as some drainage creeks penetrate deeply into the surrounding uplands, the closest elevation to the main rims was selected--400 feet mean sea level.

Approximately 80% of the canyon river aquatic segment is composed of long deep pools and glides interspersed with short cascades. Substrate is predominantly sand and bedrock. The remaining 20% of this segment is lower in gradient and the channel is less confined. Pools and riffles are the primarily aquatic habitats with gravel and cobble the dominant substrates. Sand and bedrock are also present to a lesser degree. The gravel riffles provide enough habitat to accommodate approximately 10% of all chinook salmon spawning observed in the Stanislaus River (Aceituno, 1993).

Reach 2--Foothill Reach

Reach Length:	RM 54-47, total of 7.5 RM (sites at RM 47 included in foothill reach) Covered Bridge at Knights Ferry (RM 54.5) to Bridge at Orange Blossom Road (RM 47)
Reach Width:	1500 wide, 750 feet from center line
Cover types:	Mixed Oak Woodland, Valley Foothill Riparian, Annual Grassland, Fresh Emergent Wetland, Riverine, Gravel Bar

At Knights Ferry the river corridor widens. As the river flows downstream from the upper bedrock canyon segment, a well-defined channel continues with a low gradient (0.1%) through rolling hills. Steep banks of erodible soils and bedrock are commonly present and are often opposite large flood plains. Impressive high shelves and pinnacles such as Lover's Leap, rise on one bank or the other. This reach has the largest and most abundant grasslands of the three reaches. Because the area is too steep for extensive agriculture, cattle grazing is widespread. Twelve woodlands, twenty-eight grasslands and twenty-six wetlands were delineated in this section.

This river segment is comprised of typical pool-run-riffle aquatic habitat sequences. However, each habitat type is frequently long and often irregular in occurrence. Large deep dredge pools add to the variability of steam habitat types. The dominant substrate in this segment is sand, gravel, and cobble. Approximately 90% of all chinook salmon spawning in the Stanislaus occurs within this segment (Aceituno, 1993).

Reach 3--Valley Reach

Reach Length:	RM 47-0, total of 47 RM's. Bridge at Orange Blossom Road (RM 47) to confluence with San Joaquin (0 RM)
Reach Width:	1500 wide, 750 feet from center line

Cover types: Valley Foothill Riparian, Annual Grassland, Fresh Emergent Wetland, Riverine, Agricultural

The valley reach is by far the largest reach in the study area. Where the canyon is a mere 4 river miles, and the foothill segment runs 7.5 river miles, the valley stretch is 47 river miles--80% of the study area. The course of the river is increasingly meandering. The flat valley area is highly developed agriculturally. Major crops are fruit orchards, primarily almonds and grapes. In many places along the river the study border line passes through cities, wastewater treatment plants, a munitions plant, orchards and 7 of the 16 Corps Engineer's "string of pearls" parks. Riparian is the dominant cover type covering approximately 210 acres. At RM's 9-5 is Caswell Memorial State Park, 138 acres of dense riparian habitat and home to the endangered riparian brush rabbit. In a few rare wide places like Caswell, riparian cover extends beyond the 750 width line. Fifty-seven grasslands and seventy-one wetlands were delineated in this section.

As the river flows into the low elevation valley (gradient 0.03%) the habitat is deep pools and runs with a substrate of sand and fines. Salmon use the lower segment only for adult and juvenile migration and juvenile rearing. No spawning habitat is available in the lower segment (Aceituno, 1993).

PRE-FIELD AND FIELD METHODOLOGY

Habitat Type Selection

A preliminary list of habitats was compiled from Mayer and Laudenslayer, *A Guide to Wildlife Habitats of California*, 1988. Based on distribution maps and biologist's knowledge of the area, obviously inappropriate habitats such as sagebrush were removed from the list. Ground truthing was later completed during initial site review. HEP team members collected video footage during canoe and raft trips. During these ground truthing trips and consultations with DWR botanist Debra Bishop, an additional habitat type "rockland" was added to Mayer and Laudenslayer habitat list to cover bare areas in the canyon reach.

All reaches contain cover types disturbed, agricultural, urban, riverine, riparian, and grassland. Non-habitat types used in this study are disturbed, gravel bars, and urban. Agriculture, while providing some habitat value for wildlife, was not considered a significant habitat for our study objectives, and though used as a map cover type, was not included in our HEP survey. Only the foothill reach has gravel bars whereas significant rockland habitat occurs only in the canyon reach. No notable Fresh Emergent Wetlands (FEW) occurs in the canyon reach; no notable oak woodland occurs in the valley.

Evaluation Species Selection

Evaluation species are the basis of a HEP analyses. Evaluation species represents both project area and mitigation lands, and they were selected for specific wildlife guilds within given habitat types in an effort to represent the significant biological and environmental attributes of the project area and mitigation areas.

A preliminary evaluation species list was compiled from regional wildlife species lists, various field guides, habitat/wildlife guides (Zeiner et al, 1988, 1990 and Mayer and Laudenslayer, 1988), the CDFG California Wildlife Habitat Relationships Database System, CDFG National Diversity Data Base, and suggestions from biologists at the Corps of Engineers'

Knights Ferry Information Office. In accordance with Service policy, species listed as threatened or endangered by either the Federal government or the State of California were excluded.

A total of fifteen species or guild models were selected. The criteria used to select the evaluation species for this study were:

- The species must have a relatively high probability of occurring in the study area;
- the species will likely be impacted by the project, particularly changes in flow regime;
- sufficient data must be available to assign with some degree of confidence a relationship between the HSI model, habitat quality and some measure of a species response (i.e. biomass, density, reproductive success, etc.). Species with established models are preferred but not required;
- the baseline habitat conditions at the study site are indicative of the habitat conditions for the evaluation species;
- each evaluation species utilizes the habitat type they were selected to represent and without being too much of a generalist;
- the species occupies an ecological niche that represents significant environmental values in the study area;
- the species has the potential to respond to management activities in the potential mitigation areas; and
- the species must be native to the area.

Table 1 lists evaluation species, the habitat types they were selected to represent, model variables measured in the field, abbreviations for species and cover type, and model author.

TABLE 1: Stanislaus River Hep Models -- Key List
Cover Types and Species

COVER TYPE--SPECIES			MODEL DEVELOPER--DATE
I Blue Oak-Digger Pine and Mixed Oak Woodland(W)			
1.	*Acorn Woodpecker (Melanerpes formicivorus)*	*AcWp*	*PG&E, 1986*
AcWp1	Habitat stage (see illustration)		
AcWp2	Snag/pole density per 100 Acres		
AcWp3	Percent cover oak crown canopy		
2.	*Rufous-sided Towhee (Pipilo erythrophthalmus)*	*Tohe*	*USFWS, Sept 1984*
Tohe1	Percent cover of shrubs< 16.6 ft. in height		
Tohe2	Shrub height - average height of understory		
Tohe3	Amount of foliar screen provided by shrub branches or low-hanging tree limbs		
Tohe4	Percent of ground cover shaded by vertical projection of canopies of woody vegetation > 16.5 ft		
Tohe5	Percent of ground cover of leaf litter (insect availability)		
Tohe6	Humus layers -thickness of leaf litter and humus		
3.	*Western Bluebird (Sialia mexicana)*	*BluB*	*USFWS, April 1988* DRAFT
BluB1	Percent tree canopy closure		
BluB2	Percent shrub or sapling cover		
BluB3	Percent herbaceous cover, 6" or bare ground		
BluB4	Density of snags		
II Fresh Emergent Wetland(FEW)			
4.	*Great Blue Heron (Ardea herodias)*	*GBH*	*USFWS, July 1985*
GHB1	Distance between potential nest sites and foraging areas		
GBH2	Presence of a waterbody with suitable prey population and foraging substrate		
GBH3	A disturbance-free zone up to 100 m around foraging area		
GBH4	Presence of treeland cover types within 250 m of wetland. Trees provide suitable vegetative structure for nest sites.		
GBH5	Presence of 250 m (land) or 150 m (water) disturbance-free zone around potential nest sites.		
GBH6	Proximity of potential nest site to an active nest.		

TABLE 1: Stanislaus River Hep Models--Key List
Cover Types and Species
(Continued)

COVER TYPE--SPECIES			MODEL DEVELOPER--DATE
5.	*Marshland Songbird Guild*	*MSG*	*Roberst & Larson, August 1886*
MSG1	Vegetation height (m) above ground		
MSG2	Emergent stem density		
MSG3	Cattail stem density		
MSG4	Percent of total vegetation in *Baccharis* (coyote brush)		
MSG5	Amount of site less than 10 meters from tidal channel, slough, or pond		
III Grassland(G)			
6.	*American Kestrel (Falco sparverius)*	*Kest*	*USFWS, January 1986*
Kest1	Percent bare ground		
Kest2	Percent cover of herbaceous vegetation ≤ 12 in tall		
Kest3	Percent cover of shrubs		
Kest4	Perch site availability		
Kest6	Nest site availability		
Kest7	Distance to nest site		
Kest8	Distance to food		
7.	*Western Meadowlark (Sturnella neglecta)*	*Lark*	*USFWS, July 1988*
Lark1	Height of herbaceous vegetation		
Lark2	Density of herbaceous vegetation		
Lark3	Abundance of singing perches (fence posts, shrubs, clods, telephone poles or wire, or tall weeds)		
IV Riparian(R)			
8.	*California Quail (Lophortyx californicus)*	*Quail*	*USFWS, January 1986* DRAFT
Quail1	Distance to permanent water		
Quail2	Distance to roosting cover		
Quail3	Distance to escape cover		
Quail4	Forage availability		
Quail5	Percent cover herbaceous vegetation over 10 in		
Quail6	Percent shrub crown closure		
Quail7	Distance to forage from escape cover		

TABLE 1: Stanislaus River Hep Models--key List
Cover Types and Species
(Continued)

COVER TYPE--SPECIES			MODEL DEVELOPER--DATE
9.	*Riparian Songbird Guild*	*RSG*	*CSCS, August 1986*
RSG1	Percent shrub (1-3 m tall) canopy cover		
RSG2	Percent tree (>3 m tall) canopy cover		
RSG3	Average height of overstory trees		
RSG4	Canopy layering category		
RSG5	Number of snags >4 in DBH per acre		
RSG6	Percent of site in woody riparian vegetation		
10.	*Western Fence Lizard (Sceloporus occidentalis)*	*Lizd*	*USFWS, March 1989*
Lizd1	Percent ground cover		
Lizd2	Average size of ground cover objects		
Lizd3	Structural diversity/interspersion		
Lizd4	Percent canopy cover		
V Riverine(Ri)			
11.	*Muskrat (Ondatra zibethicus)*	*Mrat*	*USFWS, June 1984*
Mrat2	Percent of year with surface water present		
Mrat3	Percent stream gradient		
Mrat4	Percent of riverine channel with surface water present during typical minimum flow		
Mrat5	Percent of riverine channel dominated by emergent herbaceous vegetation		
Mrat6	Percent herbaceous canopy cover within 10m (32.8 ft) of water edge		
12.	*River Otter (Lutra canadensis)*	*Ottr*	*USFWS, September 1984*
Ottr1	Density of streamside cover		
Ottr3	Availability and quality of denning sites		
Ottr4	Water clarity		
Ottr6	Pool availability		
Ottr7	Stream size		
13.	*Shaded Riverine Aquatic*	*SRA*	*USFWS, February 1993* DRAFT
SRA1	Overhead cover		
SRA2	Instream cover area		
SRA3	Instream cover composition		
SRA4	Instream/overhead cover interaction		
SRA5	Substrate composition		
SRA6	Water depth		

TABLE 1: Stanislaus River Hep Models--key List
Cover Types and Species
(Continued)

COVER TYPE--SPECIES			MODEL DEVELOPER/DATE
VI Rockland(Ro)			
14.	*American Dipper (Cinclus mexicanus)*	*Dipr*	*USFWS, September 1984*
Dipr1	Stream gradient		
Dipr2	Bottom substrate		
Dipr3	Number of months of open water		
Dipr4	Nest site abundance (relative abundance of bridges)		vertical rock walls, water falls,
15.	*Little Brown Bat (Myotis lucifugus)*	*Bat*	*no author*
Bat1	50-50 percent roosting habitat and water		
Bat2	Availability of hibernicula		
Bat3	Abundance of nursery roosts (buildings, tree cavities, rock crevices		
Bat4	Distance from potential nursery roost to open water		

Model Applicability

Most HSI models were used without modification. Although no HSI models available were designed for specific application to the Stanislaus River, all models were reviewed by the HEP team for applicability to the study area. All of the species selected are known to reside in the study area and discussions with local biologists and the Services' in-house HEP team coordinator indicated that the existing models were applicable and, except for those changes listed below, modifications were deemed unnecessary. Following is a discussion of the changes made to models by the HEP team.

Acorn woodpecker

This model has no value for the dense oak woodland located at the field site. After reviewing trends in the model, species description and its suitability at different densities in the DFG Wildlife Habitat Relationships Data Base, the HEP coordinator suggested an SI=.4 value to be used in calculations for small dense trees and SI=.5 for tall dense trees. The model has an SI=1.0 for <40% canopy closure and 40-69% SI=0.6. Use doesn't differ between blue oak, blue oak-digger pine or live oak woodlands.

American kestrel

This multi-covertype model was altered to create a grassland model. An assumption was made that reproductive habitat is better quality than foraging habitat and not limiting. Existence of abundant reproductive nests from adjacent riparian and oak woodlands was used in this assumption. In addition, the assumption requires that the model's three following reproductive conditions together provide reproductive habitat more suitable than foraging habitat: density of nest sites within reproductive habitat, distance from foraging habitat, and proportion of optimal nesting habitat. Field data consists of mainly vegetative variables.

River Otter

Value Otter4, water clarity, though stated in the model, was not in its HSI equation and therefore ignored.

Little Brown Bat

The model did not contain an HSI equation. CDFG staff biologist Laureen Thompson consulted with a bat expert and concluded that Bat3, "abundance of nursery roosts", is most important to little brown bats. The HEP coordinator suggested that there be two HSI equations--one combined HSI for roosting habitat and Bat3 for reproduction. The overall HSI is the lesser of the two.

Data Collection Conventions

Several conventions on data collection were agreed upon by the team. Except where stipulated in the model in English units, or where current convention is English, e.g. acre-feet, the team choose to collect data in metric units.

Information is displayed in the direction water flows--from upstream to downstream. One determines the right from left bank by looking downstream. Grasslands and woodlands were numbered upstream to downstream, and transects for grasslands and woodlands are based on those numbers. Contrarily, the remaining transects are numbered by river mile, which by convention begin at the confluence and number going upstream. River mile is the only exception to the upstream-to-downstream convention.

As most habitat variables were measured along line or belt transects, the HEP team spent a lot of time developing transect procedures to follow in the field. The HEP team determined that all transects would fall completely within one habitat type, and methods were fashioned to compensate should a transect cross into another cover type. Transect design was evaluated by reach, transect length, initial point of the transect (e.g. at water's edge or on a random point), direction of transect (e.g. perpendicular to flow, random compass direction), number of transects needed by habitat type and reach (e.g every river mile, or diminishing return, or on both banks).

Field Sheet Preparation

After habitat types and evaluation species were selected, field sheets were prepared. Each field sheet covered one habitat type--riverine, riparian, grassland, oak woodland etc.--each type printed on different color paper to facilitate application.

In addition to data required from models, extra information slots were established for site location, aerial photograph number, collectors names, direction to site, places for comments regarding incidental sightings of wildlife, landowner's name and description of key landmarks. Most of our sites were on private land and required permission from the landowner.

After initial preparation of field sheets, HEP team members tested them in the field and modified them to reflect any new information.

Field Measurement of Habitat Variables

Aerial photographs, flown June 10, 1993, at a river flow of 200 cubic feet per second, and at a scale of 1"=6000 feet, were taken by Reclamation. Habitat types were delineated on clear mylar envelopes in which each aerial photograph had been inserted, and later digitally converted into maps by DWR staff using AUTOCAD geographic information system.

HEP field data was measured by field crews of two or three members each in the spring of 1994. For crew safety and access to submerged vegetation, riverine and fresh emergent wetland data collection was delayed until late summer when irrigation flows subsided.

Crew members measured variables using a meter tape and measuring rod, clinometer, secchi disk, 1 meter or 0.5 meter square quadrats, spherical densiometer, and ocular estimation. Variables calling for field sites of 1 to 100 acres were estimated from aerials or from measurements taken from belt transects and multiplied. (One acre is 54 m wide X 25 m long X 3.) Shrubs were defined as woody vegetation less than or equal to 16.5 feet tall. Diameter breast height is measured at 4.5 feet. When a random number was needed, such as the direction of a grassland transect, a random number table was consulted and the compass heading noted on the field sheet.

HSI Determination

Variables measured in the field for each evaluation species were tabulated by transect, averaged when called for, and a Suitability Index (SI) for each variable was determined from graphs or other directions in the species' HSI model. Once SI's for each variable were calculated, the SI's importance in determining habitat value were weighted and an overall HSI computed from an equation. Tabulated values and HSI's area are attached. Calculations were executed manually and with QuatroPro software (QuatroPro for Windows, version 1.0, Borland International, Inc.).

BASELINE RESULTS

The results of the HEP are expressed in the form of Habitat Suitability indicies (HSI's). These HSI results describe the general existing quality of habitat by reach. Habitat Units (HU's) are calculated from quality units (HSI's) multiplied by quantity units (cover type acreage). This data will be included in the USFWS Coordination Act Report and should an EIS be written, it could be included as an appendix to that report.

TABLE 2: Stanislaus River Habitat Evaluation Procedure (HEP)
Study Results of Average Habitat Suitability Indices (HSI)
by Reach and by Evaluation species, 1994

Evaluation Species	Reach 1 Canyon Reach		Reach 2 Foothill Reach		Reach 3 Valley Reach	
Acorn Woodpecker	AcWp	0.86	AcWp	0.90	----	
Rufous-sided Towhee	Tohe	0.45	Tohe	0.67	----	
Western bluebird	BluB	0.48	BluB	0.67	----	
Great Blue Heron	-----		GBH	0.00	GBH	0.13
Marshland Songbird Guild	-----		MSG	0.55	MSG	0.48
American Kestrel	Kest	0.71	Kest	0.26	Kest	0.37
Western Meadowlark	Lark	0.87	Lark	0.92	Lark	0.91
California Quail	Quail	0.54	Quail	0.17	Quail	0.31
Riparian Songbird Guild	RSG	0.88	RSG	0.40	RSG	0.81
Western Fence Lizard	Lizd	0.35	Lizd	0.49	Lizd	0.32
Muskrat	Mrat	0.22	Mrat	0.20	Mrat	0.22
River Otter	Ottr	0.32	Ottr	0.49	Ottr	0.33
Shaded Riverine Aquatic	SRA	0.26	SRA	0.47	SRA	0.43
American Dipper	Dipr	0.89	-----		-----	
Little Brown Bat	Bat	1.00	-----		-----	
	Avg	**0.60**	**Avg**	**0.48**	**Avg**	**0.43**

The Valley Reach has less than two acres of the blue oak woodlands, thus this reach has no HSI's for Acorn Woodpecker, Western Bluebird, or Rufous-sided Towhee. Dipper and Little Brown Bat are found only in the Canyon Reach. Fewer than two acres of fresh emergent wetlands were found in the Canyon Reach, and consequently Great Blue Heron or members of the Marshland Songbird Guild, were not expected to be found in the Canyon Reach.

The numbers presented here are average transect HSI's by species and by reach. Reaches vary within from site to site. Initial analysis shows the three river reaches have overall moderate habitat quality--.60, .48 and .43. Optimum habitats, such as found on the Stanislaus canyon for the Little Brown Bat, show an index of 1.00. In contrast, a final HSI value of 0.00, means habitat is unsuitable. Moderate range values for life requisites (reproduction, cover, food or water) can produce an overall HSI that is moderate. An example here is as the rufous-sided towhee. Often one of the variables is considered more significant than others and weighted heavily in the final HSI equation. Occasionally moderate HSI's result when only one of the life requisites is limited, and thus habitat suitability can improve dramatically when that one variable is enhanced. An example on the Stanislaus are species affected by the limited existence of fresh emergent wetlands.

TABLE 3: Stanislaus River
Annotated Habitat Evaluation Procedure (HEP) Study Results
of Average Habitat Suitability Indices (HSI)
by Reach and by Evaluation species, 1994

Evaluation Species	Reach 1 Canyon Reach	Reach 2 Foothill Reach	Reach 3 Valley Reach
Acorn Woodpecker	**AcWp 0.86**	**AcWp 0.90**	**-----**
Generally good habitat quality. Lots of snags (standing dead vegetation) and dense oak stands. In fact, the model did not provide for oak stands as dense as we found along our transects. We had to develop a Suitability Index (SI) value for dense stands.			
Rufous-sided Towhee	**Tohe 0.45**	**Tohe 0.67**	**-----**
Moderate habitat quality. No one major life requisite of cover, reproduction, food or water appears responsible for the moderate HSI; values in general are moderate.			
Western bluebird	**BluB 0.48**	**BluB 0.67**	**-----**
Transect HSI values range from .0 to .95 resulting in a moderate HSI. No particular variable, except for lack of oak stands, affects the final value.			
Great Blue Heron	**-----**	**GBH 0.00**	**GBH 0.13**
Unsuitable habitat--at least according to the model. GBH calculations result in the only HSI with 0.00 or 0.06. Review of the data shows that this is the result of full-scale lack of disturbance buffer zones around wetland foraging areas or woodland nesting areas. The model considers heavy disturbance activities such as construction, heavy traffic and logging. However, as GBH is known in the area, it may be that GBH tolerates more disturbance than the model considers, or that disturbance during early foraging or nesting periods is generally mild, or that GBH nests or forages away from the river. GBH likes to nest together in heronries and though a heronry exists on Mormon Creek upstream of New Melones Dam, we have yet been unable to locate a local active nest. Both disturbance-free zones and active nests would be needed to improve the HSI for GBH.			
Marshland Songbird Guild	**-----**	**MSG 0.55**	**MSG 0.48**
The HSI equation for this model is massively complicated, emphasizing SI's in a elaborate manner. It's difficult to say which variable impacts the HSI most. However, the value of the HSI--the quality value--is less influential to MSG and GBH habitat than the quantity number. The acreage of fresh emergent wetland habitat is tiny compared to the acres of the stream. The river is quite entrenched and lacks extensive shallow beds. Wetlands require shallow areas where inundation is less than about five feet. The largest wetland we found was still not much larger than 0.5 acres.			

TABLE 3: Stanislaus River
Annotated Habitat Evaluation Procedure (HEP) Study Results
of Average Habitat Suitability Indices (HSI)
by Reach and by Evaluation species, 1994
(Continued)

American Kestrel	**Kest**	**.71**	**Kest**	**.26**	**Kest**	**.37**

While perched, Kestrels need to see their ground dwelling prey. This is why a combination of thick grazed grasses and lack of bareground produce a low HSI particularly in the foothill reach. The canyon reach, on the other hand, has pockets of volcanic rock, increasing the % bareground and decreasing the % herbaceous cover.

Western Meadowlark	**Lark**	**0.87**	**Lark**	**0.92**	**Lark**	**0.91**

Nice high values for grassland habitat. Lower data values for the "density of herbaceous vegetation" in reach 1 accounts for the slightly lower HSI there.

California Quail	**Quail**	**0.54**	**Quail**	**0.17**	**Quail**	**0.31**

Life requisites of food and cover differ from one reach to another. Food is available in both reach 1 and 3 but not 2, and cover is only moderately choice in reach 1. Density of forb cover (non-woody plants except grass), used by quail especially for food and sometimes for cover, seems to be the key low variable in all reaches.

	Food	Cover	Overall HSI
Reach 1	.69	.72	.54
Reach 2	.37	.36	.17
Reach 3	.70	.34	.31

Riparian Songbird Guild	**RSG**	**0.88**	**RSG**	**0.40**	**RSG**	**0.81**

Low values for the foothill reach is probably due to a deficiency in tree cover in the grassy foothills.

Western Fence Lizard	**Lizd**	**0.35**	**Lizd**	**0.49**	**Lizd**	**0.32**

Moderate to low values for riparian habitat. Nothing emerges as the primary variable responsible for describing these HSI's. However, "percent ground cover" was weighted more heavily than the other factors. "Number of ground cover objects" yielded the lowest SI values--.49, .10 and .19.

Muskrat	**Mrat**	**0.22**	**Mrat**	**0.20**	**Mrat**	**0.22**

Aside from the Great Blue Heron, muskrat has the lowest HSI's. As mentioned earlier, this is the result of limited amounts of fresh emergent wetlands in the river to provide food and cover.

TABLE 3: Stanislaus River
Annotated Habitat Evaluation Procedure (HEP) Study Results
of Average Habitat Suitability Indices (HSI)
by Reach and by Evaluation species, 1994
(Continued)

River Otter	**Ottr**	**0.32**	**Ottr**	**0.49**	**Ottr**	**0.33**

Moderate to low values for riverine habitat. The final HSI here is the result of the lowest of three--cover HSI, food HSI and reproductive HSI. Cover HSI for otters often is lowest for many transects. Reproductive HSI is the presence (SI of 1.0), nearness (SI of 0.5) or absence (SI of 0.0) of denning sites. If dens are absent, the final transect HSI falls to zero.

Shaded Riverine Aquatic	**SRA**	**0.26**	**SRA**	**0.47**	**SRA**	**0.43**

Moderate to low values for riverine habitat. Shaded Riverine Aquatic is the habitat immediately on the edge of the river--tall trees overhanging the stream, logs and other vegetation along the bank. This habitat is important especially for fish who use vegetation for shade and as refugia from fast water or fish eating birds. SRA is the habitat lost to riprap. The lower HSI value for the canyon reach can be explained in that substrate there is composed of boulders rather than preferred small sediments. Values for overhead cover may have been under-represented as we mistakenly created our field sheets to start our transects at 1.0 m from the bank rather than 0.0 m, and also we used a line transect where a band transect would have been more descriptive. Notwithstanding, overhead cover in many areas was absent or minimal.

American Dipper	**Dipr**	**0.89**	-----		-----	

High value for the rockland habitat. The final HSI equation for the dipper is the lesser of reproductive HSI and cover HSI. Except for one transect, the SI values for the canyon reach are all very high. This exception is the section of the canyon reach right at Knights Ferry where the canyon widens. Only here is the pool/riffle ratio SI .76 and substrate SI .40. These two values brought the transect reproduction HSI to .67 and lowered the entire reproductive HSI to .89. Otherwise the HSI would be .96--an exceptionally good value for the area.

Little Brown Bat	**Bat**	**1.00**	-----		-----	

Optimum value for the rockland habitat. The Little Brown Bat, which resides in the canyon reach, has found an ideal habitat. We calculated an almost unheard of HSI of 1.00. Food is not scarce as these bats prey on the nocturnal insects abundant over nearby water. Instead, roosts are most important--feeding roosts, winter hibernation roosts and nursery roosts. The canyon walls and local stream provide all these life requisites in full.

However, even though all SI values are 1.00, this model did not contain a final HSI equation. CDFG staff biologist Laureen Thompson consulted with a bat expert and concluded that Bat3, "abundance of nursery roosts", is most important to little brown bats. The HEP coordinator suggested that there be two HSI equations--one combined HSI for food and Bat3 for reproduction. The overall HSI is the lesser of the two.

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C-057768

APPENDIX C

PLANNING AID MEMORANDUM

FWS has titled the Planning Aid Memorandum under the name Stanislaus River Basin and Calaveras River Water Use Program. This name was not changed.

C-057769

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

IN REPLY REFER TO:

P 6/2/95

Memorandum

To: Roger Patterson, Regional Director, U.S. Bureau of Reclamation Mid-Pacific Region, Sacramento, California

Attn: David Lewis, U.S. Bureau of Reclamation, Mid-Pacific Region, Sacramento, California

From: Field Supervisor, Ecological Services, Sacramento Field Office, Sacramento, California (ES)

Subject: Stanislaus River Basin and Calaveras River Water Use Program, (aka American River/Folsom South Optimization Use Study), Planning Aid Memorandum

INTRODUCTION

This Planning Aid Memorandum (Memorandum) is provided to assist your planning process as outlined under Section 2 of the Fish and Wildlife Coordination Act (in 16 U.S.C. 661 et seq.). This report identifies fish and wildlife resources within the project area, and provides recommendations to protect existing fish and wildlife resources and to minimize resource losses caused by project operation. U.S. Bureau of Reclamation (Reclamation) is legislatively directed by Section 203 of the Flood Control Act of 1962 (Act of 1962) to meet all "in-basin" needs prior to using Stanislaus River water for "out-of-basin" needs. The recommendations herein are designed to address all Stanislaus River in-basin needs, as required by the authorizing legislation, prior to allocating water outside the Stanislaus River Basin. Recommendations for enhancement are also included. This report is intended to provide the foundation upon which alternatives, conclusions and recommendations can be developed.

The Stanislaus River Basin and Calaveras River Water Use Program began as a joint study between the California Department of Water Resources (DWR) and Reclamation to develop a long-term plan for conjunctive use of ground and surface water resources in the project study area. On March 3, 1995 DWR announced its formal intention to withdraw from the project when studies determined that yield from the program to the State Water Project was unlikely.

Since March of 1993 the U.S. Fish and Wildlife Service (Service) has coordinated a habitat analysis of the lower Stanislaus River, in cooperation with Reclamation, the California Department of Fish and Game (DFG) and DWR. An interagency work group called the Habitat Evaluation Procedures (HEP) team was created early on to represent different agencies and viewpoints in the process. This group has proven essential in providing assistance in the evaluation of both quantity and quality of Stanislaus River habitat.

Project Description

Reclamation is preparing a planning report and joint Environmental Impact Report (EIR)/ Environmental Impact Statement(EIS) for the long-term use of water resources (both surface and groundwater) in the Stanislaus and Calaveras River Basins. The stated program goals are to: (1) preserve and protect water resources for future growth and projected uses in areas of origin; (2) provide for increased instream flows for fishery and wildlife purposes in the

Stanislaus and San Joaquin rivers; (3) improve water quality in the Stanislaus, lower San Joaquin River, and South Delta channels; (4) increase the yield of the Federal Central Valley Project and the State Water Project while meeting Delta outflow requirements; and (5) meet current and projected local agricultural, municipal, industrial, and water quality needs (DWR and Reclamation, 1991).

According to Section 3406(c)(2) of the Central Valley Project Improvement Act (CVPIA), a Stanislaus River Basin Water Use Program EIS will be prepared by September 30, 1996. This EIS will evaluate and determine existing and anticipated future basin needs in the Stanislaus River Basin. In the course of such evaluation, the Secretary shall investigate alternative storage, release, and delivery regimes, including, but not limited to conjunctive use operation, conservation strategies, exchange arrangements, and the use of basin and channel maintenance flows, in order to best satisfy both basin and out-of-basin needs.

The Bureau of Reclamation 1980 report "Supplement to the Final Environmental Impact Statement (FEIS) on the Basin Alternatives, Water Allocations and Reservoir Operations for the New Melones Lake, Stanislaus River" focused on several alternatives. The Record of Decision to determine the needs of the Stanislaus River Basin, based on the FEIS, was signed June 29, 1981.

Fish, wildlife, and recreation impacts will continue to occur if all provisions within the Act of 1962 and the CVPIA provisions are not implemented concurrently. The Act of 1962's Stanislaus River in-basin, "interim" instream flows were met, but subsequent studies demonstrate the instream flows are not adequate. The Act of 1962's Stanislaus River channel flood control capacity would be maintained at 8,000 cubic feet per second dependent upon downstream levee constraints. The Act further states that "before initiating any diversions of water from the Stanislaus River Basin in connection with the operation of the Central Valley Project (CVP), the Secretary of the Interior shall determine the quantity of water required to satisfy all existing and anticipated future needs within the basin and the diversions shall at all times be subordinate to the quantities so determined". Recent studies by the Service (May 1993) and the State Department of Fish and Game (August 1992) have identified instream flow regime deficiencies. In conformance with the project's authorizing legislation, all in-basin Stanislaus River needs must be met prior to using Stanislaus River water for other CVP purposes. On March 6, 1995, DFG conveyed to Reclamation its preliminary streamflow schedule for the lower Stanislaus River for 1995. The schedule included increased base fishery flows from 98,300 acre-feet (af) to 155,700 af, plus spring pulses, in concurrence with the Service's instream flow study and the recommendations listed herein. Reclamation subsequently responded that they will be able to meet the schedule through at least until February 1996 (see attached table).

DESCRIPTION OF THE STUDY AREA

The Stanislaus River, one of the largest tributaries of the San Joaquin River, drains an extensive triangular shaped area lying between the Tuolumne and Calaveras River basins. The headwaters of the Stanislaus River originate at an elevation of 7,000 feet above mean sea level on the western slope of the Sierra Nevada, approximately 125 miles due east of San Francisco. The Stanislaus flows in a southwesterly direction from the Sierra crest and links with the San Joaquin River on the floor of the Central Valley at 15 feet mean sea level roughly 16 miles southwest of the town of Ripon, California. Draining northward through the Valley, the San Joaquin River meets the southward draining Sacramento River to form the Sacramento-San Joaquin Delta (DFG, 1972; Service, 1993).

The first major upstream barrier on the Stanislaus is Goodwin Dam. Located at river mile 59, this diversion dam for New Melones Dam is in the Sierra

foothills where the river leaves the mountains at an elevation of 310 feet above mean sea level (DFG, 1972). Field reconnaissance and aerial photos indicated that the Stanislaus River below Goodwin Dam can be divided into three river segments. These are essentially distributed sequentially proceeding downstream and described as the canyon, foothill and valley river reaches. These river segments are distinguished from one another primarily by differences in stream gradient, substrate and vegetation composition, and channel configuration. Two intermittent streams, Owl Creek and Wildcat Creek, enter the Stanislaus River in the canyon and foothill segments respectively. Their contributions to river discharge, however, are not significant.

Hydrologic Regime

Comparable in seasonal distribution to that of other major streams flowing into the San Joaquin Valley, natural flows into the lower Stanislaus begin with the wet season, usually in November or December and continue through June. "Calculated unimpaired inflow to Melones Reservoir, in the Period 1901-70, has ranged from a minimum of 261,100 af in 1923-24 to a maximum of 2,834,400 af in 1906-07. These extremes represent 22 and 242 percent respectively of the 1901-70 average of 1,171,000 af "(DFG, 1972).

The Stanislaus and its tributaries have been dammed fourteen times (Reisner, 1986). The river was first impounded in 1858 by the Tulloch family with a diversion dam immediately downstream of the present Tulloch Dam. In 1926 Melones Dam, a 112,500 af power and irrigation reservoir was built at a site about 3/4 miles upstream of the current New Melones Dam. Construction of New Melones Dam, with a capacity of 2,400,000 af, was first authorized with the Flood Control Act of 1944. Construction began in 1966, but due to legal and financial delays, the dam itself was not completed until 1978. The Corps of Engineers then transferred the dam for operation to Reclamation in November 1979 (Western Water Education Foundation, 1982; Tudor-Goodenough Engineers, 1959; ES, 1989).

BIOLOGICAL RESOURCES

Vegetation

Vegetation cover types in the area consist of digger pine--blue oak woodlands, valley foothill riparian, annual grassland, fresh emergent wetland and agriculture. Riparian and agriculture comprise 24 and 39 percent respectively of the cover types in the study area. "Riparian vegetation is continuous along the river but varies greatly in width. The most extensive sections of riparian vegetation occur downstream from Riverbank where the river meanders and forms a larger flood plain. The characteristic trees are Fremont cottonwood, valley oak, sycamore and ash. Tall trees (50 to 75 feet high) with broad leaves form a shady canopy over an often dense understory of shrubs and vines. The vegetation extends from the waters edge to cutbanks that delineate the river's meandering at high water stages or a limit set by agricultural operations. When trees occur in groves, an understory of shrubs and vines typically grow in association. Rose, blackberry, blue elderberry and grape are dominant plants in the understory. Each of these species is a prolific producer of fruit and the roses and blackberry form a dense cover. Willow thickets line the river especially on sandbars and along the outer bank of river bends, where flood waters prevent the growth of trees. Dense weedy cover occurs in some areas." (USCOE, 1972). Additional herbaceous plants and scattered low shrubs grow depending on water availability and include California scrub oak, toyon, digger pine, poison oak, perennial lupine, wild cucumber and wild grape. The most prevalent forbs along the river are filaree and bur-chervil. Grass cover along the river is comprised of introduced annual grasses, predominantly bromes and fescues. Sedges, nutgrass and cattail are common in the small wetland areas. Introduced noxious species include Eucalyptus, yellow-star thistle, Himalaya-berry, and tree-of-heaven.

Wildlife Resources

Wildlife sighted along the Stanislaus River include black-tailed mule deer, coyote, raccoon, beaver, western red bat, little brown myotis, gray fox, California ground squirrel, desert cottontail, black-tailed jackrabbit and striped skunk. The area provides suitable habitat for rabbits, squirrels, shrews, mice and other small mammals. Over 200 species of birds have been reported, including various owls, scrub jay, mourning dove, turkey vulture, red-tailed hawk, California quail, ring-necked pheasant, meadowlark, western bluebird, swallows, western kingbird, pied-billed grebe, kingfisher, great blue heron, common merganser, kestrels and various finches. Amphibians and reptiles sighted near the Stanislaus River include salamanders, bullfrog, western pond turtle, western fence lizard, skinks, gopher snake, kingsnake and rattlesnake.

Fisheries Resources

Between Goodwin Dam and its confluence with the San Joaquin River, approximately 59 river miles of anadromous fish habitat is available on the Stanislaus. Only the upper 33 river miles, however, provide habitat for chinook salmon spawning.

In addition to chinook salmon, *Oncorhynchus tshawytscha*, a considerable population of resident rainbow trout, *Onchorhynchus mykiss*, exists within the Stanislaus River between Goodwin Dam and Riverbank. DFG also has some information regarding the occurrence of the anadromous steelhead trout within the Stanislaus River (Bill Loudermilk, DFG). Striped bass, *Morone saxatilis*, and American shad, *Alosa sapidissima*, have been reported to have migrated to and spawned in, the extreme lower reaches of the Stanislaus River. Sturgeon, *Acipenser spp.*, have also been reported within the lower Stanislaus but are not known to spawn in the river.

Fall-run chinook salmon generally begin to migrate into the lower Stanislaus in late September and continue through mid-December. Spawning begins in mid-October and continues through early January. Incubation, and fry and juvenile rearing, occur from the spawning period through mid-May. Juvenile smoltification begins as early as late March and generally continues to early June. Although most juvenile chinook salmon emigrate as smolts the first spring after hatching and emergence, some remain in the Stanislaus beyond this period. These yearling chinook juveniles have become more common within the Stanislaus in recent years (DFG, 1987). Yearling chinook salmon have been observed in the river through the summer months and into early fall. Snorkeling surveys suggest that yearling emigration takes place when ambient air and water temperatures cool in October or November (DFG, 1992). Late fall-run chinook salmon are also reported to spawn and rear in the Stanislaus River below Goodwin Dam (Alice Low, DFG). Late fall-run spawn from December through early March. Fry and Juveniles remain in the river through the summer, and migrate out of the system the following fall. Although a much smaller part of the Stanislaus River chinook salmon fishery, the late fall-run, nevertheless, is an important component (Service, 1993).

Special Status Species

Listed, proposed and candidate species that may be found within the study area include the endangered giant garter snake (*Thamnophis gigas*) and the California red-legged frog (*Rana aurora draytoni*) which is proposed as endangered. Threatened species include valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), delta smelt (*Hypomesus transpacificus*), which could be affected by changes in flows to the Delta, Aleutian Canada goose (*Branta canadensis leucopareia*), and bald eagle (*Haliaetus leucocephalus*). Candidate species include southwestern pond turtle (*Clemmys*

marmorata pallida), California tiger salamander (*Ambystoma tigrinum californiense*), Swainson's hawk (*Buteo swainsoni*), loggerhead shrike (*Lanius ludovicianus*), western mastiff bat (*Eumops perotis californicus*), and San Joaquin pocket mouse (*Perognathus inornatus inornatus*). The Federal candidate species riparian brush rabbit (*Sylvilagus bachmani riparius*) and riparian woodrat (*Neotoma cinerea riparia*) are found only at or near Caswell Memorial State Park. The state of California has recently listed the riparian brush rabbit as state endangered. The National Marine Fisheries Services, who has jurisdiction to manage anadromous fisheries, is currently conducting a status review of all anadromous salmon and trout on the Pacific Coast (excluding Alaska). Fall-run chinook salmon of the San Joaquin Basin (Merced, Stanislaus and Tuolumne rivers), is a component.

DISCUSSION

In-basin needs must include unmet terrestrial mitigation and inadequate Stanislaus River instream flows for fish and wildlife resources. These needs are not only in-basin needs, they are as identified above, now to be considered project purposes as defined by the CVPIA.

In 1958 the DFG determined that there was 3,300 acres of excellent riparian wildlife habitat along the Stanislaus River between Knights Ferry Bridge and the San Joaquin River confluence. In that same area today this has been reduced to 2,582 acres. Most of the acreages was lost to agriculture and urban expansion before 1965.

The original Goodwin Dam and inundation area construction impacted approximately 10,000 acres of oak woodland, foothill chaparral, riparian wildlife habitat. The 2,500 acre Peoria Mountain Wildlife Management Area (PMWMA) was set aside to partially compensate for the 10,000 acre reservoir inundation. After establishing PMWMA, a "Baseline Conservation Camp" was constructed on the site without compensation. The on-going project impacts with unmet project mitigation needs have not been completely evaluated. DFG and Corps of Engineers agreed to a supplemental mitigation plan to acquire and protect by fee and easements, riparian habitat along the Lower Stanislaus River downstream of Goodwin Dam. The extent and adequacy of the fee/easement acquisition effort requires evaluation to determine its effectiveness.

The current fishery flow release from New Melones Reservoir is 98,300 af annually, with provisions for release of 69,000 af in critically dry years. However, an interim agreement, executed in 1987 between Reclamation and DFG, provides for variable flow releases from 98,300 af to 302,000 af annually, based on inflow, reservoir storage, and water demands. According to recent studies, these flows are inadequate to preserve and protect downstream fish and wildlife resources. In addition to the fishery flow agreement, Reclamation has an interim arrangement with the South Delta Water Agency and the State Water Resources Control Board to provide an annual release of up to 70,000 af or more, if adequate supply exists, for water quality control purposes in the San Joaquin River.

The Service and DFG have on-going studies which provide recommendations to meet the immediate "interim" Stanislaus River instream flows. First, "The Relationship Between Instream Flow and Physical Habitat Availability for Chinook Salmon in the Stanislaus River, California" (Instream Flow Report), May 1993, evaluated Stanislaus River instream flows related to providing physical habitat (Table 1). Consequently, the flows identified in Table 1 should be considered as minimum "interim" base fishery flows needed in the Stanislaus River, until a comprehensive instream flow regime is developed which integrates other macrohabitat conditions, such as water quality and temperature, and the value of conveyance and attraction flows.

Table 1. Instream flows which would provide the maximum weighted usable area of habitat for chinook salmon in the Stanislaus River, between Goodwin Dam and Riverbank. (Source: The Relationship Between Instream Flow and Physical Habitat Availability for Chinook Salmon in the Stanislaus River, California. Service, May 1993.)

Life Stage	Dates	# Days	Goodwin Dam Release (cfs)	(acre-feet)
Spawning	Oct. 15 to Dec. 31	78	300	46,414
Egg Incubation/ Fry Rearing	Jan. 1 to Feb. 15	46	150	13,686
Juvenile Rearing	Feb. 15 to Oct. 15	241	200	95,605
	Totals	365		155,705

Second, DFG's August, 1992 "Salmon Habitat - Stanislaus River" evaluation considered anadromous fisheries, water quality, and resident rainbow trout needs. Recommended Stanislaus River instream flows from both reports represent a more accurate "interim" instream flow need in the Stanislaus River Basin (Table 2). Note that Table 2 uses the "below normal" water year Stanislaus River instream flow regime for our "interim" analysis because the sustainable yield of the Stanislaus Basin above Goodwin Dam requires recalculation. DFG incorporated water quality, anadromous fisheries attraction and outmigration flow, and rainbow trout needs into its instream flow recommendations, whereas the Service (Table 1) did not.

Table 2. Lower Stanislaus River Flow Schedule (Below Normal Water Year), Source: August 1992. Salmon Habitat Criteria - Stanislaus River, DFG.

Date	# Days	Goodwin Dam Releases (cfs)	(TAF)
Oct. 01 - Oct. 14	14	250	6.9
Oct. 15 - Dec. 31	78	300	46.4
Jan. 01 - Mar. 31	90	250	44.6
Apr. 01 - May 31	61	400	48.4
Jun. 01 - Sep. 30	122	250	60.5
Spring Outmigrant Flow (April - May) (Based on a 30-day flow of 1,200 cfs)			71.4
Fall Attraction Flow			15.0
	Total		293.3

RECOMMENDATIONS

Reclamation should enter into a new "interim" long-term contract and modify Stanislaus River in-stream flow requirements simultaneously.

The Act of 1962 and the CVPIA address all Stanislaus River in-basin needs. The authorizing legislation states that all in-basin needs must be met prior to allocating water outside the Stanislaus River Basin. Fish and wildlife resources and habitats are included as an in-basin need which must be protected prior to allocating water outside the basin.

Our recommendations for the protection of the project area's fish and wildlife resources are in conformance with the Service's Mitigation Policy (published in the Federal Register 46:15; January 23, 1981). This policy provides Service personnel with guidance in making recommendations to protect or conserve fish and wildlife resources. By helping ensure consistent and effective Service recommendations, the policy allows agencies and developers to plan early for mitigation needs.

The Council on Environmental Quality and the Service Mitigation Policy define mitigation as including the following elements: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts. The Service considers these elements to represent the most desirable sequence of steps in the mitigation planning process. In determining when to move from any one element to the next in the sequence, success or failure of particular techniques or approaches in the past under similar circumstances (as reflected in the results of previous mitigation evaluation studies) are taken into account.

In accordance with our mitigation policy, and to meet the intent and purposes of the Act of 1962 and the CVPIA, the Service recommends that Reclamation:

1. Meet all in-basin needs including those of fish and wildlife, prior to committing water for out-of-basin needs.

2. Implement the Stanislaus River instream flows from the Service's May 1993 Instream Flow Report where the annual minimum base fishery flow regime for all water year "types" totals 155,705 af. Reclamation and DFG should enter into a new Memorandum of Understanding (MOU), replacing the current MOU and embracing the recommended flow regime (Table 1). An in-basin need requirement of the Act of 1962 should be adopted as the minimum "interim" flows in the Stanislaus River until supplemental studies are completed. Specifically, the recommended 155,705 af minimum should replace the "98,300 af annually with provisions for release of 69,000 af in critically dry years" in the 1987 interim agreement with DFG.

3. Complete the supplemental studies identified in the 1987 interim agreement with DFG. The results of these fishery studies should be integrated with the Instream Flow Report, the Stanislaus River Temperature Model and other available and appropriate data (such as information provided by the Anadromous Fish Restoration Program pursuant to CVPIA) to develop a comprehensive instream flow schedule for the Stanislaus River, in cooperation with the Service and DFG.

4. Expand on the salmon spawning gravel restoration projects conducted by DFG.

5. Prepare and implement a plan for the enhancement and restoration of riparian habitat due to its reduction and deterioration. The Habitat Evaluation Procedures Study can be used as baseline. Options to

consider in the plan include setback levees and habitat expansion of the endangered riparian brush rabbit, *Sylvilagus bachmani riparius*.

6. Reevaluate unmet mitigation for the original project. Expand the 2,500 acre Peoria Mountain Wildlife Management Area to resolve unmet terrestrial wildlife habitat mitigation requirements. Compensate for construction of the "Baseline Conservation Camp" in the Management Area. Evaluate the extent, adequacy and effectiveness of the riparian habitat fee/easement acquisition effort.

7. Consider investigating the condition of the ecosystem of the Calaveras River including the status of a previously described chinook salmon population. Populations have dropped dramatically in recent years, due to insufficient stream flows during critical times of the year or during periods of drought, impairment of migration due to dams, and unscreened agriculture and municipal diversions.

SUMMARY

The Service views project alternatives on the Stanislaus River from the broad perspective of the CVPIA and the Act of 1962. The Act of 1962 identifies in-basin needs as the first priority for using Stanislaus River water. The Act of 1962 and the CVPIA clearly indicate that adequate instream flows must accompany in-basin water contracts. The intent and purposes of the acts include protection of fish and wildlife resources as an equal project purpose to providing water for other in-basin needs. The CVPIA recognizes the inadequate CVP mitigation and compensation efforts, but attempts to protect, restore, and enhance fish, wildlife, and associated habitats along with providing water for agriculture, municipal and industrial purposes. The New Melones Project is not excepted from inadequate CVP mitigation. Adequate compensation for unavoidable adverse impacts of constructing and operating New Melones Reservoir and Goodwin Dam was not provided.

Thank you for the opportunity to assist in your planning process. Questions regarding this Planning Aid Memorandum may be directed to Marla Macoubrie at (916) 979-2745.

Cay C. Goude

for Joel A. Medlin

C-057777

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Lower Stanislaus River Below Goodwin Dam
March 1, 1995 Through February 28, 1996

	A NEW DFG (155.7 TAF)		B EXISTING DFG (98.3 TAF)		C FWS PRELIM (378.0 TAF)		D DIFFERENTIAL (279.7 TAF)	
Month	cfs	TAF	cfs	TAF	cfs	TAF	cfs	TAF
March	200	12.295	211	12.971	550	33.810	339	20.839
April	200	11.898	211	12.552	975	58.003	764	45.450
May	200	12.295	211	12.971	1,325	81.452	1,114	68.481
June	200	11.898	--	--	1,025	60.977	1,025	60.977
July	200	12.295	--	--	250	15.368	250	15.368
August	200	12.295	--	--	250	15.368	250	15.368
September	200	11.898	--	--	250	14.873	250	14.873
October	300	15.467	200	12.295	300	18.442	100	6.147
November	300	17.847	200	11.898	300	17.847	100	5.949
December	300	18.442	200	12.295	300	18.442	100	6.147
January	150	9.234	200	12.295	300	18.442	100	6.147
February	200	9.630	200	11.105	450	24.986	250	13.881
		~155.7 plus spring pulses		~98.3 plus spring pulses		~378.0		~279.7

A - New base flow allocation from Stanislaus River Fishery Study results. Monthly allocations adjustable annually based on conditions, but within 155.7 TAF total plus pulses.
B - Existing base allocation for 1995; assumes conjunctive use June through September as in the past.
C - February 9, 1995 preliminary FWS schedule.
D - Monthly and total differential between schedules B and C.

Source: Department of Fish and Game, Region 4, March 6, 1995